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ABSTRACT

Three hundred twenty-six disadvantaged boys and girls in pre-kindergarten and kindergarten were pre- and post-tested in clay sculpturing, drawing and verbal cognitive abilities to determine whether teaching children through a non-verbal art medium, clay, would improve their verbal skills. Assessment instruments were developed. Children were assigned to 1 of 4 treatment groups in which teachers (1) encouraged children's clay activities; (2) provided guidance through discussions of how to solve clay sculpturing problems; (3) supplemented discussion with demonstrations of techniques for working with clay; and (4) provided no special treatment (this group served as a control). The data analysis focused on 3 research questions: (1) Does intervention through clay make a difference in the development of children's verbal cognitive achievement? (2) Does the method of teaching clay make a difference in the development of children? and (3) What type of clay teaching program is best for which type of children? Children in the combined experimental teaching programs made significantly more improvement than the control group in clay, drawing, and verbal cognition achievement, and the technique teaching approach was most effective in developing clay, drawing and verbal cognitive capabilities in all boys and girls. These and other findings are discussed in detail. Appendices provide information on testing and teacher-training materials used in the study. (Author/SE)

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IMPROVING THE VERBAL COGNITIVE SKILLS
OF
DISADVANTAGED PRESCHOOL CHILDREN THROUGH THE ARTS

PROJECT TERMINATION REPORT
May 31, 1977

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FOREWORD

Beginning Creativity

Creation to the child is breathing,
      And in the breath lies waiting
                  The Universe
      With all its glory, mystery,
                  Timeless, Awesome Grandeur.

The child reaches out into the world,
Becoming aware of worldness without,
But still so sensitive to that inner space,
Providing wholeness to what is fragmented,
                  Warmth to what is cold.

Creating therefore is an easy task,
For the child allows the outworld
                  To have its form,
But only such form as can be shaped
By the eager mind and hand of the child
      As he sends forth
                  The Message
      From the universe
                  Within.

A. SUMMARY

IMPROVING THE VERBAL COGNITIVE SKILLS OF DISADVANTAGED PRESCHOOL CHILDREN THROUGH THE ARTS

B. Needs Assessment.

Ample evidence exists to show that large proportions of disadvantaged children, regardless of racial or ethnic background, experience failure in the early elementary years, after which their failure in school accelerates. The losses to the children and society are high. That this circumstance obtains among disadvantaged children in Columbus is illustrated in the comparison of scores on reading tests showing that not only does the proportion of children falling below expectancy level increase with the number of years spent in school, but the gap between achievement and expectancy widens as well.

An examination of scores on first grade readiness tests in Columbus schools indicates that of children tested in Priority I and Priority II schools, 38.5 percent fall below expectancy level while in a sample of non-priority schools, only 9.5 percent of the children tested score below expectancy level as measured by the same tests.

C. Project Goals.

The purpose of this project was to develop approaches to preschool education which would use the strengths of the child to develop his weaknesses. Disadvantaged children have difficulty with the verbal skills expected by the school. We tried to improve the children's verbal skills by teaching them through a non-verbal art medium, CLAY, in which they can be as successful as advantaged children.

The three comprehensive project goals were stated as follows:

1. To identify teaching strategies for intervention in clay modeling which will result in growth in verbal cognitive skills of pre-kindergarten and kindergarten children attending priority schools.
2. To train teachers and educational aides in teaching strategies using clay which will result in maximum verbal cognitive development for pre-kindergarten and kindergarten children in priority schools.
3. To develop and refine reliable instruments for teacher use in measuring and monitoring children's levels of ability in clay modeling, drawing, and verbal cognition.

D. Program Description.

Implementation of the project took place in two phases. The first phase involved the refinement of instruments for use in assessing and monitoring children's levels of ability in clay modeling, drawing, and verbal cognitive skills. The second phase consisted of training teachers in the use of specific teaching strategies in clay modeling activities, which they used for sixteen weeks in their own classrooms. Based on the results from pre- and posttesting of the children in those classrooms using evaluation instruments developed in Phase I, these intervention strategies were assessed.

The intervention strategies identified were:

1. Encouragement: The child was encouraged in whatever he did with the clay.
2. Observation/Discussion: The child was provided with clay, subjects or topics, experiences with those topics, and encouraged in his efforts.
3. Technique: The child was provided with clay, subjects, experiences, and techniques for working with clay.
4. A non-intervention group was identified to control for maturation and schooling.

Three hundred twenty-six boys and girls in Pre-kindergarten and Kindergarten were pre- and posttested in clay sculpturing, drawing, and verbal cognitive abilities to determine the effectiveness of clay intervention. The clay and drawing tests included making a dog (a subject to be taught), a person (a subject not taught to test transfer of learning), and a subject of the child's own choice (free clay).

E. Project Outcomes.

The major objective of this study was to test the hypotheses implied in the following performance objectives for children:

Given 32 half-hour sessions of clay sculpturing, children in three treatment groups will demonstrate a statistically significantly greater improvement based on pretest and posttest data than the children in the control group in the following areas:

1. In their clay sculpturing achievement, both cognitively and artistically;

2. In their drawing achievement;
3. In their verbal cognitive achievements.

For the convenience of research and reporting, the objectives were translated into the following research questions:

1. Does intervention through clay make a difference in the development of children's verbal cognitive achievement?
2. Does the method of teaching clay make a difference in the development of the children?
3. What type of clay teaching program is best for which type of children?

Results.

1. The combined experimental teaching programs made significantly more improvement than the Control Group in clay, drawing, and verbal cognition achievement.
2. The Technique Teaching Program was most effective in developing clay, drawing, and verbal cognitive capabilities in boys and girls, Pre-kindergarten and Kindergarten.
3. The Technique Teaching Program is most helpful to most children of low, medium, or high intellectual ability; low, medium, or high classroom adjustment; low, medium, or high beginning sculptural ability; and low, medium, or high talkativeness.

Only the Technique Teaching Program was successful in helping most children at the low levels of each continuum. Children of higher ability usually made high gains in the Technique Group but also made gains in the other groups.

The Technique Group was most effective for the Pre-kindergarten unless the children were very low in their beginning sculptural ability. In that case, the Encouragement program was most effective.

Kindergarten also made greatest gains in the Technique program but also benefited from other programs.

Clay is especially valuable as a medium for boys. Even the Control boys made gains in clay. Girls were successful with clay and verbal achievement when they had intervention with the clay activities.

F. Dissemination.

The project, being an experimental study, was disseminated informally by providing information about the project. Some coverage was provided by the media while we were working in the schools. Community groups, teachers and university groups were kept informed of the progress.

G. Conclusions.

Clay intervention was a successful means for improving preschool children's clay, drawing, verbal, and cognitive skills. We recommend that clay intervention be included in the preschool curriculum as one of many media to develop the young child's capabilities and in helping him learn to learn.

H. Phase-In.

Many teachers who taught their classes with clay during the project are continuing the program with their children during the year following the intervention phase and are encouraging other teachers to try it. No formal phase-in program has begun at this time. We hope to find the best way to teach teachers how to teach children with clay.

B. NEEDS ASSESSMENT

Description of Project Local Agency.

The City of Columbus is part of one of the fastest growing metropolitan areas in the United States. Between 1960 and 1970, Columbus proper increased 14.5 percent in population and approximately 45.54 square miles in area. Because of this tremendous growth the Columbus Public Schools have become the 16th largest school system in the United States. New schools, school expansions, and additional staff were necessitated. In 1964 there were 3,700 teachers in the Columbus City Schools; this number now exceeds 4,600. During this same period of time, student enrollment has increased with an accompanying increase in the teacher-student ratio. Current enrollment shows 102,417 students in the system.

The City of Columbus is not without some of the problems found in other large cities. The area within the inner belt, approximately one mile in radius from the intersection of Broad and High streets, claims a high proportion of the poor; thirty-nine percent of the families habitating this section of the city have annual incomes of less than $3,000; and within this area is found seventeen percent of the county's deteriorating and dilapidated housing. The cultural makeup of this part of the city is predominantly urban Black and Appalachian. This area is classified as an emerging ghetto with attendant problems. National, state, and local support have contributed to the development of agencies designed to deal with the social, housing, medical, and employment problems in Columbus' inner city. Among these are Model Cities, CMACAO (Columbus Metropolitan Area Community Action Organization), and ECCO (East Central Citizens Organization).

In many schools within this area, pupil and institutional goal achievement is hindered by many complex factors. While community and school programs attempt to overcome or compensate for those factors which interfere with effectiveness of educational efforts (problems of poverty, substandard housing, unemployment, medical care, mobility, human relations), there is a need to develop approaches to education in the early years that will provide the strongest possible foundation for success in school. This project focused on the use of teaching techniques for preschool education which capitalized on the strengths of young children from classrooms in designated priority* schools.

Groups Which had Input Into Needs Assessment.

The assessment of needs was determined by examining evaluation reports made available through the Department of Evaluation, Research, and Planning during the 1972-73 school year, as well as recommendations made by teachers, principals, parents, nonpublic school authorities, and representatives of other agencies. Recommendations of the Project Unite** effort were also examined in this connection.

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* Priority schools are those qualifying for services provided by ESEA Title I Funds.

Statement and Documentation of Educational Need.

> "The low income, urban Negro child is failing in our schools. His inability to read is a major challenge to contemporary educators because of its relationship to the child's self esteem and his ultimate social effectiveness."[1]

Ample evidence exists to show that large proportions of disadvantaged[2] children, regardless of racial or ethnic background, experience failure in the early elementary years, after which their failure in school accelerates. The losses to the children and society are high. That this circumstance obtains among disadvantaged children in Columbus is illustrated in the comparison of scores on reading tests showing that not only does the proportion of children falling below expectancy level increase with the number of years spent in school, but the gap between achievement and expectancy widens as well.

An examination of scores on first grade readiness tests in Columbus schools indicates that of children tested in Priority I and Priority II schools, 38.5 percent fall below expectancy level while in a sample of non-priority schools, only 9.5 percent of the children tested score below expectancy level as measured by the same tests. (See Table 1.)

It is recognized that the educational process does not take place in a vacuum. Many factors impinge on the students and teachers as they participate in the educational process; the community environment is but one of these. One major factor, incidence of ADC cases to enrollment, has been shown to strongly influence school success.

A study of the relationship of ADC to academic achievement was conducted following publication of the first Columbus School Profile in May, 1969. It was found that the incidence of ADC-supported families is the most powerful variable among the factors on the Profile in predicting the

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** Project Unite was the acronym for a highly successful community educational needs assessment project caled Understand Needs, Improve Tomorrow's Education. Two thousand citizens throughout Columbus were Involved in successive work sessions to develop and publish a report delineating Columbus' educational problems and proposed solutions. The report was completed and published in May, 1972, with successive implementation reports.

[1] Baratz, Joan C., "Linguistic and Cultural Factors in Teaching Reading to Ghetto Children," in Remedial Reading: Classroom and Clinic, Schell and Burns (Eds.). New York: Allyn and Bacon, 1972, p. 66.

[2] The term "disadvantaged" for the purposes of this study refers to children attending priority schools. Incidence of ADC cases to enrollment is the index used to designate priority schools in the City of Columbus.

level of achievement in a school. The correlation between ADC cases and reading achievement, for example, was found to be -.81. Annual monitoring of areas showing significant ADC concentrations compared with an analysis of citywide test scores from schools serving these areas continues to validate the use of ADC data as a viable method of establishing not only poverty areas, but areas having a need for compensatory supportive and educational programs. We assume that Columbus children are an example of children in the rest of the country.

Preschool education of children in these schools needs to include as a major aim the development of those abilities essential to later success in school. One set of these essential abilities is "cognitive." These are abilities associated with "knowing" and "knowing one knows," achieved by the child at a level where he can gain pleasure from the display and pursuit of his knowing. Preschool education for disadvantaged children needs to include programs systematically designed to achieve "cognitive development."

Historically, preschool education has generally served affective needs rather than cognitive needs. In consequence, the objective of cognitive development calls for relatively new and different teaching methods--especially so when that aim is seen as unobtainable apart from a correlative development in the affective domain. The methods needed cannot simply be added methods for an added objective but methods which freshly reconstruct the old to include the objective of the old with the new in a more developed integration.

> "The current literature on disadvantaged children indicates that they learn best in more concrete, inductive, kinesthetic and less verbal situations. In view of this, teachers should search for methodology coordinated with this learning style."[3]

This project responded to the need "for methodology coordinated with this learning style." Assuming that expression in a non-verbal medium such as clay is easier for the young child than expression through language and paper-pencil activities, we used clay to try to foster cognitive and language development in disadvantaged preschool children. Rather than using a weakness (school-type verbal skills) to develop a weakness, we capitalized on a strength of the child to improve his weak areas.

Tables 2 and 3 show a comparison of the performance of 34 advantaged children and 36 disadvantaged children in clay and drawing. The advantaged children were more expressive in the clay and had more correctly placed details, more three-dimensional details, and higher rating on the proportions. The differences reached at least the .05 level of confidence. The disadvantaged children made larger objects and used more time for the free clay. However, there were no statistically significant differences between the two groups in their ability to work with the clay either sculpturally or cognitively to produce recognizable products. When the children could choose their own subject (free clay) the differences in their accomplishments were least obvious.

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[3] Fantini, Mario D. and Weinstein, Gerald. "Making Contact with the Disadvantaged," in Radical School Reform, Gross (Ed.). New York: Simon and Schuster, 1969, p. 173.

TABLE 1

METROPOLITAN READING READINESS TEST

Spring 1973
Total Scores (Vocational and Comprehension)

NON-PRIORITY SCHOOLS

School	Total No. Tested	No. Scoring Below .7
302	101	2
314	41	1
320	55	6
328	41	5
332	40	0
336	73	9
344	56	6
353	119	16
354	82	9
368	109	7
376	88	26
384	51	0
394	98	4
	954	91

91

954 = 9.5% Below Expectancy

PRIORITY I AND II SCHOOLS

School	Total No. Tested	No. scoring Below .7
528	89	43
674	73	38
575	96	29
424	65	20
532	80	48
659	57	18
862	46	30
519	89	15
502	71	20
644	72	30
645	49	22
473	70	4
396	47	28
	904	348

348

904 = 38.5% Below Expectancy

TABLE 2 THE SIGNIFICANT DIFFERENCES BETWEEN THE PERFORMANCE OF ADVANTAGED AND DISADVANTAGED PRESCHOOL CHILDREN IN CLAY MODELING OF THREE SUBJECTS

Variable Name	Person		Dog		Free	
	Adv.	Disadv.	Adv.	Disadv.	Adv.	Disadv.
	P	P	P	P	P	P
Overall Sculpture	-	-	-	-	-	-
Surface	-	-	-	-	-	-
Space	-	-	-	-	-	-
Unity	-	-	-	-	-	-
Expression	-	-	.01	-	.01	-
Utility	-	-	-	-	-	-
Average	-	-	-	-	-	-
Recognizability	-	-	-	-	-	-
Physical Details	-	-	-	-	-	-
Decorative Details	-	-	-	-	-	-
Background Details	-	-	-	-	-	-
Correctly Placed Details	.05	-	-	-	-	-
Whole Figure	-	-	-	-	-	-
3-D Details	.05	-	.01	-	-	-
Proportions	.05	-	.05	-	-	-
Technique	-	-	-	-	-	-
Height	-	-	-	.05	-	.01
Width	-	-	-	-	-	.01
Time	-	-	-	-	-	.01

TABLE 3 THE SIGNIFICANT DIFFERENCES BETWEEN THE PERFORMANCE OF ADVANTAGED AND DISADVANTAGED PRESCHOOL CHILDREN IN DRAWING THREE SUBJECTS

Variable Name	Person		Dog		Free	
	Adv.	Disadv.	Adv.	Disadv.	Adv.	Disadv.
	P	P	P	P	P	P
Recognizability	.01	-	.01	-	-	-
Physical Details	.01	-	.01	-	.01	-
Decorative Details	-	-	-	-	-	-
Background Details	-	-	-	-	-	-
Total Details	.01	-	.05	-	.01	-
Correctly Placed Details	.01	-	.01	-	-	-
Perspective	-	-	-	-	-	-
Proportions	.01	-	.01	-	-	-
Technique	.01	-	.01	-	.05	-
Height	-	-	-	-	-	-
Width	-	.01	-	.05	-	.05
Time	-	-	-	-	-	.01

Advantaged children were significantly better in representing their ideas in drawing than the disadvantaged children. Drawing is a paper-pencil activity which requires more abstraction to represent an image in two dimensions and it is more related to school-like activity than clay. Advantaged children are more likely to have had drawing experience at home than the disadvantaged children.

Differences between the advantaged and disadvantaged children in their verbal enumeration were less obvious. The disadvantaged children are orally verbal. The number of words said by the two groups was not significantly different. However, the disadvantaged children used significantly more repetitions than the advantaged children. This finding probably indicates a less developed vocabulary and memory organization on the part of the disadvantaged children.

Thus the data support the assumption that clay is easier for the disadvantaged children than more abstract media, and is a viable medium for teaching children who "learn best in more concrete, inductive, kinesthetic and less verbal situations." (See Tables 2 and 3.)

The project prescribed teaching programs specifically designed to use clay modeling as a means to cognitive development thereby providing for preschool disadvantaged children an opportunity to gain in cognitive capacities so essential to their eventual success in school, while also benefiting from satisfaction and growth in the affective domain. Inherent in the design of the program were provisions for the training of teachers and educational aides in the teaching strategies prescribed and the assessment of children's abilities in the areas under study. In addition, the project resulted in instrumentation and techniques for the assessment of those abilities. Thus, the project responded to Project Unite recommendations that: (1) curriculum must be set for Kindergarten and Pre-kindergarten programs citywide to develop and design a program to meet the individual needs of children; (2) diagnostic tools designed to adequately determine a child's progress must be developed to assess children in Kindergarten and Pre-kindergarten; and (3) extensive inservice training must be developed for teachers.

Desired Status to be Achieved Through the Project.

We hypothesized that the children who had intervention in their clay activities would make growth in their clay, drawing, and verbal/cognitive skills which would be observably greater than the growth made by children in the control group who had no regular clay activities in their school program.

C. PROJECT GOALS

The broad purpose of this project was to develop approaches to preschool education which will incorporate specific cognitive dimensions into a predominately affect-oriented program. The medium selected was clay modeling which offers potential for integrating cognitive, affective (expressive), sensori-motor, and social learning in the preschool program.

The three comprehensive project goals were stated as follows:

1. To identify teaching strategies for intervention in clay modeling which will result in growth in verbal cognitive skills of pre-kindergarten and kindergarten children attending priority schools.
2. To train teachers and educational aides in teaching strategies using clay which will result in maximum verbal cognitive development for pre-kindergarten and kindergarten children in priority schools.
3. To develop and refine reliable instruments for teacher use in measuring and monitoring children's levels of ability in clay modeling,drawing, and verbal cognition.

D. PROGRAM DESCRIPTION

General Directions of the Program

The project was designed to develop approaches to preschool (pre-kindergarten and kindergarten) education which would capitalize on the cognitive content in activities typically used for social and affective development. Clay modeling was the focal activity of this study. The children involved in the project attended Title I priority schools (public and parochial) in Columbus. Critical needs addressed by the project were: (1) providing improved education opportunities for disadvantaged youth; and (2) developing approaches to preschool education.

Implementation of the project took place in two phases. The first phase involved the refinement of instruments for use in assessing and monitoring children's levels of ability in clay modeling, drawing, and verbal cognitive skills. The second phase consisted of training teachers in the use of specific teaching strategies in clay modeling activities, which they used for sixteen weeks in their own classrooms. Based on the results from pre- and posttesting of the children in those classrooms using evaluation instruments developed in Phase I, these intervention strategies were assessed.

Justification for the Study.

Related Studies. The use of clay modeling for affective development was the subject of a study by D.T. Barclay (School Arts, Vol. 69) wherein he attempted to strengthen the self-image of disadvantaged children by means of creative art education. One of the outstanding findings was that these children had a clear preference for clay as the desired creative medium. One of the basic problems faced by the investigators was the lack of adequate motivation, of self-direction. The children had a low level of awareness and sensitivity with regard to sight and touch. The most significant conclusion of the study was that those artistic activities designed to make the children more independent and give them greater self-confidence also gave them the greatest satisfaction. Activities requiring them to turn to the teacher caused conflict.

R. Hartley[4] and his colleagues emphasize, among other things, the social value of clay modeling. Since this activity is generally done in groups, it can serve as a good means for creating a social bond, particularly for the restrained or fearful child; modeling can serve as a protective coat behind which the hesitant child can get to know his classmates while kneading away at a lump of clay. The children seem to work as a group without being subject to social pressure. The investigators claim that clay modeling is valuable for loosening the fetters of the tongue; a sensitive observer near the modeling at once notes the child's free-flowing speech as well as his references to significant likenesses from his private world.

V. Lowenfeld[5], who was interested in the intellectual aspect of creativity, took note of the sensor-motoric aspect of clay modeling activities, particularly at nursery school age (2 to 4 years). As for the cognitive aspects, he also included modeling in the framework of his phased model. He analyzed the development of artistic-intellectual abilities in the preschematic stage (age 5 to 7) and noted that at this stage one can already see the search for a concept of definite form even in modeling. As for the schematic stage, he said that since clay is three-dimensional, it awakens thinking of a new kind. According to him the true essence of clay is its plastic quality. Clay can therefore be used better with children of developed concepts as the very essence of the material calls for a flexible use of these concepts. Lowenfeld also emphasized the value of modeling as a means of developing a sense of personal value and a positive self-image.

Dr. S. Smilansky and Prof. Ross Mooney conducted a study in Title I qualified schools (Project No. 2-0137, Final Report--September 1973) which examined the possibilities for congitive development through drawing, in the framework of a wide series of studies on preparing the young disadvantaged child to meet school requirements. They found that the children's drawing abilities could be improved markedly in a short time. In addition, there was a positive transfer from these activities to cognitive abilities related to drawing (as expressed in visual memory and picture-reading tests), and an average increase of 16 points in IQ as measured by the Goodenough-Harris Drawing Test. In addition, scales for assessing children's drawings for cognitive and affective content were produced in the course of this study.

In 1972, Dr. Smilansky undertook to study the use of clay modeling for cognitive growth among disadvantaged kindergarten children in Israel and found advances in clay modeling ability to be accompanied by corresponding improvement in drawing ability and certain verbal cognitive areas for the children she examined. The experience of the Israeli study relative to evaluation method and styles of teacher intervention provided a foundation on which to build and adapt to meet the needs of the population to be served through this project in Columbus.

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[4] Hartley, R. E., et al. Understanding Children's Play. New York: Columbia University Press, 1964.

[5] Lowenfeld, V. Creative and Mental Growth. New York: The MacMillan Company, 1970.

Why is a Clay Experiment necessary? A preliminary survey conducted by Smilansky in Israel showed that in practice there is often lacking a full realization of the value inherent in clay modeling activity. Some kindergarten teachers dislike clay because it is "dirty" and do not often give it to the children; others do not appreciate its special values and their knowledge of instruction in the subject is deficient. Smilansky found great differences between kindergarten classes with respect to the frequency of use of clay modeling. As to instruction, it was discovered that many variants existed with respect to the amount of directiveness and expectations of the teachers. Some teachers seldom intervene at all--even when a child is trying and fails to express himself with the clay. Others expect that at a very early stage of the activity the child will achieve a successful realistic representation of subjects common in the kindergarten. They do not attach as much importance to the creative process, but place more emphasis on the finished product by displaying it or calling attention to it. Only a few teachers, by their own efforts, find some intuitive way to help the children develop their ability gradually.

Indications are that disadvantaged children in particular require the intensive instruction and help of an adult by one method or another in order to make advances in cognitive development.

Based on theories of cognitive development and Smilansky's work in the use of creative media for the development of cognition, the assumption was made that the effective use of clay modeling activities could advance preschool children, particularly disadvantaged ones, in such dimensions as: mental flexibility, understanding of layers of several dimensions, and self image.

Indeed, /if/ it were demonstrated that systematic instruction in clay modeling by the preschool teacher could raise children's cognitive level, and /if/ detailed methods of instruction based on a systematic presentation of the material are made available to teachers, /then/ clay modeling could be added to the teachers' repertoire of media for helping a larger number of children to benefit from this clay activity and from the advancement which it may bring.

As to the nature of this advancement, a number of the material's characteristics offer possibilities for the cognitive development of the disadvantaged child in areas in which he is typically deficient:

1. Three dimensions--a characteristic which compels the child to consider a number of dimensions at one time and therefore to broaden his observations and perceptions, preventing him from making one-sided judgments and constraining him to try to integrate his different observations.

2. Flexibility of material--facilitates 'trying out,' continuous change and renewed trial, and therefore gives the child a sense of freedom to act, freedom to choose and makes it possible to avoid stereotypes and rigidity of thinking.
3. Diversity of manipulation--many investigators, particularly among those who are followers of Piaget, claim that manipulative trial is very important as a basic condition for the development of logical thinking and language. Furthermore, the child's success in expressing himself with the help of clay can increase his sense of mastery, give him a feeling of competence and thus improve the self esteem of the disadvantaged child. The emotional aspect should not be overlooked, as it has been suggested that the release of basic asocial (anti-social) drives through sensorimotoric activities enables the child to attain mental activity at a higher sublimatory level. Activity around the clay modeling table also provides a good opportunity for increased vocal activity and interaction.

In addition, through the application of prescribed teaching approaches, it may be possible to raise children's levels in specific cognitive abilities whose connection with clay modeling appears to be less direct, i.e., visual discrimination, vocabulary, concepts of space, ability to generalize and ability to integrate. The assumption is that the kindergarten teacher can easily employ the framework of clay modeling activities for directed development in these areas because the child who is modeling is open to intellectual stimulation in those areas and may therefore be readily receptive. How the attempt to represent objects in clay requires increased ability in visual discrimination and the ability to choose between the relevant and irrelevant elements is described briefly as follows:

Concept of Space - The three-dimensional character of clay necessitates spatial consideration, and here the preschool teacher can readily contribute to the learning process by introducing concepts to the children while they are actively modeling. Concepts include above, below, inside, in front of, behind, over, between, etc.

Vocabulary - Clay has certain descriptive qualities such as hard, soft, smooth, rough. It also has applied to it certain actions which can be described with verbs: to press together, to join, to add, to shorten. The assumption here is that this vocabulary can be imparted naturally and quickly during the modeling.

Ability to Generalize - Since the intent is to concentrate the intellectual stimulation of the child being instructed around certain central subjects, it can be supposed that there may be progress in his ability to generalize and increase his sensitivity to the criteria of generalization.

Ability to Integrate - The object of teaching strategies is to guide the children during the clay modeling to attempt to integrate different contents into a more comprehensive whole. The subjects to be modeled are developmental in progression, moving from simple to complex, with each lesson building on preceding lessons. The hypothesis is that this will have implications for the child's ability in verbal integration which will result in better expression when he interprets a picture. (Picture reading scale.)

General Procedures. Given this general foundation on the use of clay modeling to develop cognitive skills, this project aimed first to establish a systematic and reliable means for measuring the abilities in question. Dependable measures were of primary importance to the project for determination of the effects of intervention strategies. Perhaps of even greater importance is their availability for use by classroom teachers in assessing growth in children's skills as an integral part of the teaching-learning process.

The second and central focus of the project was the implementation of teaching strategies designed to foster verbal cognitive development through clay modeling. Three intervention styles were used.

1. Encouragement - Children had time for clay modeling, necessary materials, ready approval for the products they created, and encouragement in their clay activity. The rationale was that children have the ability, and given an opportunity would develop skill on their own.
2. Observation/Discussion - Children had time for clay modeling, materials, and support. In addition, the teacher discussed with the children the subject to be modeled, enabling observations to be made and using illustrative devices in order to elaborate on the subject. The rationale for this approach was that children have the ability, and given additional visual stimulation and the chance to select and organize their memory of a subject would develop additional skill in modeling and would develop their language and problem-solving skills during the process.
3. Technical Training - Children had the same opportunity and materials as the encouragement group, as well as the mental stimulation of the discussion group. They also were given assistance in dealing with the medium. The teacher drew attention to the nature and characteristics of the material. She showed them how forms can be shaped, drew attention to texture, using a variety of techniques. The rationale for this method was that children can develop their clay modeling ability more effectively with help in stimulation of memory only when assistance is also available in the management of the medium.

A fourth group of children was identified who had no intervention with clay. This group served as a control group to determine the effects of maturation and regular schooling.

The first project year was devoted to the refinement of instruments for use in assessing the effects of intervention in clay modeling on levels of drawing ability and verbal cognition. Instruments were designed for use by classroom teachers in assessing levels of ability and progress in the skills under study (clay modeling, drawing, verbal cognition).

A preliminary sample of 200 disadvantaged children, pre-kindergarten through second grade, randomly selected was involved in the developmental study. Each child produced clay models of a human figure, a dog, and an item of his choice (free clay). Each child also made drawings of the same subjects, and was examined in verbal cognitive areas using scales which focused on specific verbal skills. The tests are described in Section E.

From the data collected from these two hundred children, the tests were refined, and scales were developed for assessment of cognitive aspects of clay and drawing achievement for sculptural or artistic abilities in clay modeling. Tests were selected for assessment of verbal-cognitive achievement.

During the Summer of 1975, the first year data were also used to plan the intervention strategies for the following year. The sample was selected for the intervention year, and in September, teacher training was begun.

The second project year consisted of pretesting a random sample of the children in the participating classrooms. The testing was done by substitute teachers. The classroom teachers then taught with clay twice each week in approximately 30-minute sessions, using the particular teaching method assigned to them. Posttesting followed intervention immediately.

The data were then coded, processed, and analyzed during the Summer and Fall of 1976.

Project Resource Persons and Involvement. Planning for the project had its roots in the study of drawing as a means for fostering cognitive growth among disadvantaged children in Columbus (Smilansky and Mooney, 1971-73), and in Smilansky's 1972 study of the use of clay modeling for cognitive development with Israeli children. The outcomes of these studies as well as the instruments devised therein provided a basis for this project.

Formal planning was initiated in discussions between Dr. Smilansky and representatives of Columbus Public Schools in the Summer and Autumn of 1972. These discussions were continued in Summer, 1973, preparatory to submission of the Letter of Intent.

Preparation of the preliminary proposal involved sessions with representatives of Columbus Diocesan Schools, private schools in Columbus, evaluation consultants, Title I personnel and evaluators in Columbus Public Schools, and faculty from The Ohio State University's College of Education. These people continued to participate through the development of the Formal Proposal.

Phase I Personnel

Staff:

Frank Maraffa, Director
Charlotte Huddle, Coordinator
Dr. P. Helen Lewis, Coordinator
Judith Hagan, Art Teacher
Dr. Sara Smilansky, Consultant - University of Tel Aviv
Dr. Ross Mooney, Consultant, The Ohio State University

Others involved were numerous teachers, principals, and other school personnel in the schools where we tested children for Phase I.

The Community Communications Council, who met four times each year, were:

Ruby Comer	- Developmental Disabilities Specialist Human Resources Center
Sue Ann Deibert	- Housewife (Diocesan)
Hannah Dillard	- Assistant Director Community Coordinated Child Care Program
Ellen Gow	- Consultant to Business, Industry, and Schools
Erena Jurist	- Housewife
Henry Leland	- Psychologist and Professor The Ohio State University
David Lore	- Reporter on Special Assignment The Columbus Dispatch
Jesse M. Robbins	- Owner Hegler Office Supplies
Maggie Smith	- Volunteer
Sr. Julienne Marie	- Reading Supervisor Diocesan Center

Department of Evaluation, Research, and Planning
Columbus Public Schools

Sue Conard
Ray Gugle
Dr. Calvin Smith

Phase II Personnel

Staff:

Frank Maraffa, Director
Dr. P. Helen Lewis, Coordinator
Judith Hagan, Art Teacher
Charlotte Huddle, Guidance Counselor
Dr. Sara Smilansky, Consultant, University of Tel Aviv
Dr. Ross Mooney, Consultant, The Ohio State University (Voluntary)

Eight substitute teachers who tested the children.

Thirty-nine classroom teachers and their education aides, who were trained to use Specific Clay Strategies in their classrooms.

Fourteen teachers and their education aides, whose students were pre- and posttested only.

Community Communications Council:

Ruby Comer - Developmental Disabilities Specialist
Human Resources Center

Hannah Dillard - Assistant Director
Community Coordinated Child Care Program

Shirley Engelman - Manager
Arts and Crafts Shop

Carolyn Focht - Reporter on Special Assignment
The Columbus Dispatch

John Hoffman - Government Programs Coordinator
Diocesan Center

Erena Jurist - Housewife

Henry Leland - Psychologist and Professor
The Ohio State University

Eleanor Porter - Housewife

Jesse M. Robbins - Owner
Hegler Office Supplies

Maggie Smith - Volunteer

Sr. Julienne Marie - Reading Supervisor
Diocesan Center

Department of Evaluation, Research, and Planning
Columbus Public Schools

Sue Conard
Ray Gugle
Dr. Calvin Smith

Computer and Evaluation Consultant
The Ohio State University

Roger Brown

E. PROJECT OUTCOMES: PHASE I - DEVELOPMENT OF INSTRUMENTS FOR ASSESSMENT

Overview of Phase I Activities.

The primary focus of Phase I project activities was to develop an efficient, reliable, valid testing package which could be utilized in Phase II of this project to assess clay modeling, drawing, and verbal cognition skills of pre-kindergarten and kindergarten children.

Two major problems face researchers in selecting instruments for assessing abilities of young children. The young child, like older subjects, interprets questions and situations in the light of his own experience. However, the young child's experience is limited, his interpretation is egocentric and idiosyncratic. Therefore, he tends not to give expected responses to verbal tests, and in testing across cultures, responses are even less consistent and generalizable. Consequently there are few reliable, standardized tests available for use with young children.

The second problem stems from the inability of the young child to read or write. All verbal tests must be given orally and individually, which is time-consuming. Furthermore, the young child can function maximally in a verbal testing situation for only a short time. Tests must be short or be given in segments. If the test is too limited, the sampling of the child's ability or achievement may be inaccurate. If the test is too long, the results may deteriorate because of fatigue or boredom.

Our task in selecting and developing clay measures had a two-fold purpose. We needed instruments to assess the growth which might result from the experiment with clay. We also hoped that we might find that a teacher observing a child working with a non-verbal medium, clay, could get one more indication of the child's cognitive ability, if she had an instrument to guide her observations. In this case the child would not be expected to interpret and respond to words, as is the case in most tests, but he would interact with a non-specific medium to express what he knows, and the assessment is based on his ability to express what he knows from his own background and experience. We had to develop an observation scale for clay modeling. We also wanted to know if growth in cognitive abilities acquired in clay modeling would transfer to growth in another non-verbal medium (drawing), and to growth in verbal cognitive abilities.

During the Summer of 1974 exploratory studies were conducted with 4- to 8-year-old children in preschools and summer schools. Children of each age, both disadvantaged and advantaged, were asked to make objects from clay, while the researchers observed their behavior and studied their products. Tests which Smilansky had used in the Israeli study were administered to the children to determine their effectiveness with children of the American culture. As a result of those experiences an experimental instrument package was compiled to assess the abilities of preschool children in clay, drawing, and verbal-cognitive tasks.

The instrument package was field tested in September through January, 1975-76. Two hundred children were randomly selected from a stratified population of pre-kindergarten, kindergarten, first, and second grade pupils, representative of upper and lower socio-economic groups. Substitute teachers were trained to test the children individually in a four-day sequence using the experimental instrument package.

Each child was asked to make from clay a dog, a person, and an object of the pupil's free choice; to make a drawing of a dog, a person, and an object of the pupil's choice; to respond to a variety of cognitive tests, some of which were normed instruments and some of which were developed by the staff. The non-standardized tests were administered again in a re-test situation fifteen days after the first test session. The results of this field testing are presented below by objective.

Results of Phase I.

Facilitating Objective 1.0 - To develop instrumentation for assessing clay modeling ability of pre-kindergarten and kindergarten children.

The base for this instrument was the work done by Dr. Sara Smilansky[6] with Israeli children. The instrument Dr. Smilansky used assessed only the presence or absence of certain characteristics and qualities of a child's clay model of a human figure. We needed to develop an instrument that would include growth dimensions from the very crude or primitive to a much higher level of skill--allowing for anticipated growth in clay modeling among the children to be studied. We were particularly interested in determining the cognitive aspects of clay modeling and determining growth in those aspects as related to growth in other cognitive abilities.

Following the exploratory studies in the Summer of 1974, an observation scale was developed on the basis of the observations of children with clay, Dr. Smilansky's Israeli scale, and the Harris-Goodenough Drawing Test.

The validity of the instrument was certified on both a content and construct basis by Dr. Sara Smilansky, Dr. Ross Mooney, and Ms. Judith Hagan, an art specialist. The reliability of this Clay Modeling Observation Scale was established on its seven major areas of assessment:

Recognizability
Correct Placement of Physical Details
Proportions
Three Dimensional Details
Textures
Connection of Parts
Method of Working with the Whole Figure

Reliability was established on both an inter- and intra-judge basis using commonly accepted methodology. The data were analyzed concerning both the product and the process for the three required clay figures: dog, person, and free choice. The analysis revealed that the sub-areas of Proportions and Connection of Parts for both the dog and person scales needed revision, as well as the Recognizability on the person scale.

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[6] Smilansky, Sara, and Boaz, Tirza. An Experiment Designed to Examine the Possibility of Advancing the Cognitive Level of Disadvantaged Kindergarten Children by Means of Clay-Modelling. Unpublished. September, 1972.

Modifications were made by including Connection of Parts in the process section of the scale and by simplifying the Proportion scale. The revised Clay Modeling Observation Scale interjudge reliability estimates are presented in Table 4. The scale as revised for Phase II is included in Appendix A.

TABLE 4 CLAY MODELING OBSERVATION SCALE INTER-JUDGE RELIABILITY ESTIMATES

	Subsection	Person, Dog, Free Product Average Inter-judge Agreement	
		Clay Scale	Drawing Scale
PROCESS	Verbal Activities	r = .7033	r = .8533
	Method of Working	.9533	.6866
	Method of Connecting Parts	.6566	--
	Process Patterns	.8266	--
	Feelings	.6833	.7166
PRODUCT	Recognizability	.6900	.7166
	Physical Details	.6100	.3400
	Decorative Details	1.0000	.8033
	Background Details	.8700	.8566
	Correctly Placed Physical Details	.6350	.6350
	Proportions	.7800	.5850
	Whole Figure/Shape	.6800	--
	Perspective	--	1.0000
	3-D Details	.5366	--
	Size of Figure	.8200	.8100
TECHNIQUE	Overall Technique	.5700	.7100
	Textures	1.0000	.9533
	Use of Clay Tools	1.0000	--

The data for computing the reliability coefficients were collected during the pre-test training session for substitute teacher testers during Phase II.

The data indicate that reliability of the clay modeling observation scale was substantiated on all major areas of assessment. The level of reliability considered appropriate for research purposes of the project was .70 + .10. The value computed for the Three-Dimensional Details subsection (.54 rounded), although falling somewhat below the minimum desired level, was judged to be adequate for continuation.

In collecting the data from the clay scale, data were simultaneously collected from the drawing observation scale and inter-judge reliability estimates were computed. These values are shown in the far right-hand column. With the exception of the Physical Details subsection, all major areas of assessment on the drawing observation scale were shown to be reliable across judges. The value obtained on Physical Details (.34) was far below the minimum desired level and was, therefore, rechecked following additional training of the testers. Two subsequent reliability checks, one in November and a second in February prior to posttesting, produced reliability estimates of the magnitude .97.

Facilitating Objective 2.0 - To refine instrumentation for assessing the drawing ability of pre-kindergarten and kindergarten children.

The instrument for assessing the drawing ability of children was based on the instruments developed for a study of drawing and cognition in a previous Columbus Public Schools instructional project conducted by Smilansky and Mooney.[7] As an addition to this instrument a scale was developed to observe the process the children used in drawing. Out of thirty items on the original process checklist used in the field testing, seven items were checked frequently enough to be included in the revised instrument.

Therefore, the only items from the original forms that were reconsidered for inclusion on the Phase II instruments were those that related specifically to the actual process of producing a drawing. These items dealt with the sequence in which portions of the object were produced and the amount and locality of the drawing surface utilized. The person and dog forms were identical; therefore, items considered for the revised form were the same for person and for dog. Since the free form was necessarily less specific in order to allow for flexibility of observation regardless of what the child drew, this form included an open-ended item relative to the child's sequence of drawing portions of the product. However, the items pertaining to the drawing surface utilized were identical to the person and dog forms of the instrument.

Table 5 shows the specific items considered for the revised form and the "pre-post" average of the item mean scores for person, dog, and free.

The revised forms of the person and dog instruments used the items cited in a slightly revised form and expanded the concepts illustrated by the items (sequence and surface utilized) into a ten-item checklist, five items per concept. The intent of the revised forms was to yield one response per subject on each five-item set. The revised drawing scale is in Appendix A .

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[7] Mooney, Ross L. and Smilansky, Sara, An Experiment in the Use of Drawing to Promote Cognitive Development in Disadvantaged Preschool Children in Israel and the United States. U.S. Department of Health, Education, and Welfare, Office of Education. September, 1973. Washington, D.C.

TABLE 5 PROCESS-RELATED ITEMS
PRE-POST AVERAGE MEAN

	Pre-Post Average Mean		
Item	Person	Dog	Free
Began the drawing with the head	1.88	1.81	--
Began the drawing with the body	1.95	1.94	--
Began the drawing with the legs	1.90	1.95	--
Began the drawing with another part	1.82	1.80	--
Concentrated on bottom of paper; did not seem to see entire paper as a surface to be used	1.94	1.90	1.50
Concentrated on center of paper	1.69	1.79	1.37
Concentrated on corner of paper	1.99	1.92	1.80

Facilitating Objective 3.0 - To refine an instrumentation package for measuring verbal cognition in pre-kindergarten and kindergarten.

A pool of standardized and non-standardized instruments capable of measuring verbal cognition was assembled. Each was pilot tested among a group of Phase I pupil participants. These devices were:

1. A Clay Verbs Test
2. Test of Verbal Enumeration
3. A Test of Similarities and Differences
4. A Picture Reading Test
5. The Embedded Figures Test
6. The Wide Range Achievement Test (WRAT)
7. The Wechsler Pre-School and Primary Scale of Intelligence (WPPSI)

The data collected from the disadvantaged pre-kindergarten, kindergarten, and first grade boys and girls were used for computing correlation coefficients of tests 1 through 5 with The Wide Range Achievement Test. All of the non-standardized measures correlated significantly (minimum level of $p < .10$) with at least some portion of the WRAT battery administered. (Table 6.) These correlations of the non-standardized tests with the standardized WRAT indicated that the non-standardized tests could be interpreted with confidence.

TABLE 6 VERBAL/COGNITIVE MEASURES CORRELATIONAL DATA

Variable 1	Variable 2	N	r_{12}	Significance Level
WRAT (Spelling)	Similarities/Differences			
	Pretest Total	20	.399	$p < .10$
	Posttest Total	20	.617	$p < .01$
	Embedded Figures	26	.456	$p < .02$
	Clay Verbs			
	Pretest	68	.400	$p < .001$
	Posttest	69	.542	$p < .001$
	Verbal Enumeration			
	Dog Pretest	70	.268	$p < .05$
	Person Pretest	70	.364	$p < .01$
	Dog Posttest	70	.276	$p < .05$
	Person Posttest	67	.251	$p < .05$
	Picture Reading (Total)			
	T-Unit	11	.573	$p < .10$
	Total Words	11	.574	$p < .10$
WRAT (Math)	Similarities/Differences			
	Pretest Total	20	.437	$p < .05$
	Posttest Total	20	.557	$p < .01$
	Embedded Figures	26	.221	NS*
	Clay Verbs			
	Pretest	68	.557	$p < .001$
	Posttest	69	.626	$p < .001$
	Verbal Enumeration			
	Dog Pretest	70	.197	$p < .10$
	Person Pretest	70	.359	$p < .01$
	Dog Posttest	70	.163	NS
	Person Posttest	67	.108	NS
	Picture Reading (Total)			
	T-Unit	11	.358	NS
	Total Words	11	.058	NS

* No Significant Gain

TABLE 6 (Cont.) VERBAL/COGNITIVE MEASURES
CORRELATIONAL DATA

Variable 1	Variable 2	N	r_{12}	Significance Level
WRAT (Reading)	Similarities/Differences			
	Pretest Total	20	.443	$p < .05$
	Posttest Total	20	.553	$p < .02$
	Embedded Figures	26	.160	NS
	Clay Verbs			
	Pretest	68	.367	$p < .01$
	Posttest	69	.508	$p < .001$
	Verbal Enumeration			
	Dog Pretest	70	.297	$p < .01$
	Person Pretest	70	.362	$p < .01$
	Dog Posttest	70	.182	NS
	Person Posttest	67	.204	$p < .10$
	Picture Reading (Total)			
	T-Unit	11	.525	$p < .10$
	Total Words	11	.601	$p < .05$
WRAT (All Subtests)	Similarities/Differences			
	Pretest Total	20	.42	$p < .10$
	Posttest Total	20	.59	$p < .01$
	Embedded Figures	26	.28	NS
	Clay Verbs			
	Pretest	68	.45	$p < .001$
	Posttest	69	.56	$p < .001$
	Verbal Enumeration			
	Dog Pretest	70	.25	$p < .02$
	Person Pretest	70	.36	$p < .01$
	Dog Posttest	70	.21	$p < .10$
	Person Posttest	67	.19	$p < .10$
	Picture Reading (Total)			
	T-Unit	11	.49	NS
	Total Words	11	.44	NS

The data for computing the correlation coefficients were collected from the sample of Phase I subjects from disadvantaged Columbus elementary schools. The correlations reflect pre-kindergarten, kindergarten, and first grade data from boys and girls. Data show three subtests from the Wide Range Achievement Test (WRAT) correlated with six non-standardized measures of verbal or non-verbal cognition.

All of the non-standardized measures correlated significantly (minimum level of $p < .10$) with at least some portion of the WRAT battery administered. When the correlations of all three WRAT subtests with each of the non-standardized measures were averaged (using Fisher's Z transformation), the Embedded Figures Test and the Picture Reading Test were the only instruments yielding non-significant correlations.

The technical manual for the Embedded Figures Test presents some limited, preliminary standardization information. Normative data for the instrument aregiven in terms of means and standard deviations based upon a relatively small standardization sample of students. However, this information would also assist in the interpretation of data from this instrument in Phase II. The data obtained from the remaining non-standardized instruments used in the project can be interpreted with confidence based on the observed correlational value with the known normed instrument, WRAT.

The final selections of instruments to be used for assessing cognitive abilities were made on the basis of recommendations from the evaluator, time limits of the testing sessions, and needs of the study as determined by the research team.

The Wide Range Achievement Test was eliminated by the evaluator because of the limited number of items to which a four-year-old could respond.

The Embedded Figures Test was available in a preschool form, normed for four-year-olds, in time for Phase II. The Pre-school Embedded Figures Test and the Children's Embedded Firgures Test (for kindergarten and up) was included in the package because of figure-ground emphasis and its relationship to art. It is also a type of non-verbal performance test.

Although the Wechsler Pre-School and Primary Scale of Intelligence (WPPSI) was administered in Phase I, the sample was too small for an adequate statistical analysis. However, our need for a standardized usable instrument to assess verbal and cognitive ability brought us back to the WPPSI in Phase II. Based on Dr. Smilansky's experience, and our lack of success in finding another instrument, we decided to use the verbal subtests of the WPPSI and the Picture Completion subtest from the performance I.Q. section.

The locally constructed Test of Similarities and Differences was eliminated to avoid duplication with the Similarities subtest of the WPPSI.

The final battery of tests included:

A Clay Verbs Test
Test of Verbal Enumeration
The Embedded Figures Test
A Picture-Reading Test
The Wechsler Pre-School and Primary Scale of Intelligence
    Subtests: Information
        Vocabulary
        Comprehension
        Similarities
        Arithmetic
        Picture Completion
        Total Verbal I.Q.

Since children's drawings of a person were available from the drawing portion of the assessment, the drawings were also scored according to the Harris-Goodenough Drawing Test as a further performance measure of cognitive ability.

Five instruments relative to the measurement of verbal/cognitive abilities were implemented during Phase II. The statistical rationale for implementing each instrument presented in Table 7 is based upon information from technical manuals and/or pretest data collected from the sample of Phase I students (pre-kindergarten through first grade) from disadvantaged elementary schools.

TABLE 7 VERBAL/COGNITIVE ASSESSMENT PACKAGE
1975-76

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1. Wechsler Pre-School and Primary Scale of Intelligence (WPPSI)

   Statistical Rationale:

   a. Reliability coefficient of internal consistency averaged across age groups 4 to 6½ years is .81 -.84 for the six subtests administered (Information, Vocabulary, Arithmetic, Similarities, Comprehension, and Picture Completion).

   b. Reliability coefficient of stability is .66 -.93 for the subtests administered.

   c. Concurrent validity has been established with the Stanford-Binet Intelligence Scale, Form L-M ($r = .32 - .63$ for the subtests administered); the Peabody Picture Vocabulary Test, Form A ($r = .37 - .53$); and the Pictorial Test of Intelligence ($r = .22 - 56$).

2. Preschool Embedded Figures Test (PEFT)

   Statistical Rationale:

   a. Reliability coefficient of internal consistency is .74 -.86.

   b. Reliability coefficient of stability is .69 -75.

   c. Construct validity has been established with the Block Design subtest of WPPSI ($r = .55 - .56$, $p < .01$) and with the Q Sort Autonomous Achievement Striving Items ($r = .35 - .73$, $p < .05$).

   d. Concurrent validity has been established with the spelling subtest of the WRAT ($r = .46$, p .02).

3. Children's Embedded Figures Test (CEFT)

   Statistical Rationale:

   a. Internal consistency reliability estimates for 5-6 year olds are unavailable from the technical manual.

   b. Reliability coefficient of stability is .87.

   c. Concurrent validity has been established with the spelling subtest of the WRAT ($r = .46$, $p < .02$).

   NOTE: The CEFT is recommended primarily for research purposes due to the insufficient statistical information presently available.

TABLE 7 (Cont.) VERBAL/COGNITIVE ASSESSMENT PACKAGE
1975-76

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3. Clay Verbs Test

   Statistical Rationale:

   a. Reliability coefficient of internal consistency is .66.

   b. Content validity has been established by consultants in the areas of measurement, pre-school education, the arts, and language acquisition.

   c. Concurrent validity has been established with overall performance on the Wide Range Achievement Test ($r = .45, p < .001$).

4. Test of Verbal Enumeration

   Statistical Rationale:

   a. The nature of this measurement does not permit an estimate of internal consistency relaibility. Also, the two forms (person and dog) cannot be considered parallel forms to estimate the coefficient of equivalence.

   b. Reliability coefficient of stability is .44.

   c. Content validity has been established inasmuch as the student's score is based upon his own responses offered from his individual vocabulary and experiences.

   d. Concurrent validity has been established with overall performance on the Wide Range Achievement Test ($r = .25 - .36, p < .02$).

5. Picture Reading Test

   Statistical Rationale:

   a. Reliability coefficient of stability is .89.

   b. Construct validity has been established through correlation of each item with the total score to which it contributed ($r = .82 - .95, p < .01$).

   c. Concurrent validity has been established with the Spelling and Reading subtest of the Wide Range Achievement Test ($r = .57 - .60, p < .10$ and $p < .05$).

The statistical information for the instruments outlined indicates that 1) all instruments demonstrated an ability to yield reliable data, and 2) all instruments demonstrated validity for the purposes intended.

Facilitating Objective 4.0 - To revise tests of clay modeling, drawing and verbal cognition as indicated by field testing results.

Revisions have been indicated in the description of Objective 1.0 through 3.0. The revised instruments are included in Appendix A.

Facilitating Objective 5.0 - To develop an effective procedure for the study of validity of instruments designed to assess clay modeling, drawing, and verbal cognition of kindergarten and pre-kindergarten children.

Instrument Validation.

A major objective of the project during Phase I was to establish the concurrent validity of each instrument to be used for assessing clay modeling, drawing, and verbal/cognitive abilities. Such information would establish the extent to which the instruments to be used in Phase II could be expected to relate to known measures.

The information presented below is based upon analysis of Phase I data collected from the sample of pre-kindergarten, kindergarten, and first grade students from disadvantaged schools.

Instrument	Validation
Clay Modeling Observation Scale	with Drawing Observation Scale, $r = .31 - .78$ $p < .10 - p < .001$*
Drawing Observation Scale	Goodenough-Harris Drawing Test**
Picture Reading Test	with Wide Range Achievement Test, Spelling $r = .57$, $p < .10$; with WRAT, Reading, $r = .56$, $p < .10$
Clay Verbs Test	with Wide Range Achievement Test, $r = .45$, $p < .001$
Test of Verbal Enumeration	with Wide Range Achievement Test, $r = .25 - .36$, $p < .02$
Wechsler Pre-School and Primary Scale of Intelligence	with Stanford-Binet Intelligence Test, Form L-M, $r = .32 - .63$; with Peabody Picture Vocabulary Test, Form A, $r = .37 - .53$; with the Pictorial Test of Intelligence, $r = .22 - .56$
Embedded Figures Test	with Wide Range Achievement Test (spelling subtest), $r = .46$, $p < .02$

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* Validation (based upon data from a random sample of Phase II students) was computed across nine corresponding subsections of each instrument. Two subsections, decorative details and background details, did not correlate significantly. However, the more comprehensive subsection of total physical details yielded the most significant correlation ($p < .001$). The data presented may be questioned by some since the validation instrument related to drawing ability and not clay ability. However, the specific items of the

Procedure for preserving clay products.

For both cognitive and sculptural evaluation, it was necessary to be able to compare the pretest clay product with the posttest clay product. Two major problems presented themselves:

1. Young children often construct delicate and fragile products with clay which are impossible to move without damaging them. Unless fired, the clay pieces were not strong enough to be saved over a period of time.
2. The volume of clay pieces (6 for each child in the testing sample!) made storage impossible.

Photographs combined with drawings of the clay pieces seemed to be the best solution for saving the products. In order to discover if analyzing photographs and drawings of clay pieces in place of the actual pieces themselves would cause undue problems and be scored differently, a trial run was made with two judges scoring a sample of clay pieces and, separately, drawings and photographs of those clay pieces. No appreciable differences between the two types of approaches were found, and therefore photographs and drawings of clay pieces were used as a standard procedure for the remainder of the project.

Therefore, photographs of each product were taken by one of three trained members of the staff. These photographs were stapled to the tester's drawing and description of the product. The photographs, drawings and descriptions were used for the pre-posttest evaluations and comparisons.

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drawing scale (which correspond closely to the Goodenough-Harris Test) were modified to relate to clay and included on the Clay Observation Scale. Therefore, the two instruments, although related to different media, are similar in purpose.

** Since the Goodenough-Harris instrument was not administered during Phase I, a quantitative estimate of concurrent validity cannot be computed. However, the development of the locally-constructed Drawing Observation Scale depended significantly upon the Goodenough-Harris standardized measure. The items composing the product and technique evaluation sections of the instrument correspond very closely with the specific scoring points on the Goodenough-Harris. Hence, although concurrent validity cannot be demonstrated statistically, the content of the Drawing Observation Scale has been validated.

TABLE 8

THE RELATIONSHIPS BETWEEN THE COGNITIVE CLAY SCALE AND THE STANDARDIZED COGNITIVE TEST

Number of Children = 326	Cognitive Clay Scale (Person and Dog)																									
Standardized Cognitive Tests	Recognizability		Physical Details		Decorative Details		Background		Total Details		Correctly Placed		Proportions		Whole Figure		3-Dimensional Details		Height		Width		Technique		Texture	
	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P
Clay Verbs	.43	.001	.40	.001	-.03	*	-.003	*	.39	.001	.40	.001	.42	.001	.12	.05	.28	.001	.05	*	-.04	*	.37	.001	.001	*
Embedded Figures	.26	.001	.26	.001	-.06	*	.03	*	.24	.001	.23	.001	.23	.001	.11	.05	.18	.001	.07	*	.02	*	.17	.001	.03	*
WPPSI:																										
Information	.34	.001	.33	.001	-.06	*	-.008	*	.30	.001	.34	.001	.32	.001	.07	*	.22	.001	-.01	*	-.03	*	.17	.001	.11	.05
Vocabulary	.30	.001	.32	.001	.03	*	.08	*	.33	.001	.30	.001	.29	.001	.18	.001	.21	.001	.01	*	-.02	*	.16	.01	.11	.05
Picture Completion	.22	.01	.21	.001	-.03	*	.05	*	.20	.001	.25	.001	.20	.001	-.0003	*	.06	*	.007	*	-.03	*	.06	*	.09	*
Arithmetic	.25	.001	.22	.001	-.08	*	-.03	*	.19	.001	.21	.001	.22	.001	.07	*	.10	.05	-.02	*	-.09	*	.16	.01	.03	*
Similarities	.12	.05	.21	.001	-.11	.05	-.11	.05	.16	.01	.17	.001	.19	.001	.09	.05	.11	.05	.03	*	-.04	*	.02	*	.09	*
Comprehension	.21	.001	.27	.001	-.04	*	-.02	*	.25	.001	.23	.001	.23	.001	.15	.01	.16	.01	.06	*	.004	*	.14	.01	.07	*
Verbal I.Q.	.31	.001	.35	.001	-.07	*	-.02	*	.32	.001	.32	.001	.33	.001	.15	.01	.21	.001	.009	*	-.05	*	.17	.001	.11	.05
Harris-Goodenough Drawing Test	.40	.001	.37	.001	.04	*	-.01	*	.35	.001	.38	.001	.35	.001	.03	*	.24	.001	.06	*	.02	*	.21	.001	.05	*

r = Pearson correlation coefficients

P = Level of confidence

* No Significant Correlation

Further Studies of the Cognitive Clay Scale.

Although the clay scale was validated in Phase I as described, Phase II provided a larger population of children, data from the revised scale, and more extensive testing with standardized tests. Therefore, we conducted some further studies of the clay scale with Phase II data to gather more information about the cognitive aspects of clay sculpturing and to answer questions basic to our rationale for intervening in children's cognitive development in the medium of clay.

The following questions were studied:

1. Does clay sculpturing require certain cognitive skills?
2. Within a given medium (clay), is it reasonable to expect transfer of learning from a subject taught (dog) to a subject not taught (person)?
3. Within a given subject (i.e., dog or person), is it reasonable to expect transfer of learning from a non-verbal medium taught (clay) to a non-verbal medium not taught (drawing)?
4. Within a given subject (i.e., dog or person), is it reasonable to expect transfer of learning from the non-verbal medium (clay) to the verbal medium (oral language)?

The results of these studies follow.

1. Does clay sculpturing require certain cognitive skills?

If intervention in clay is going to improve cognitive abilities of children, we must know what is "cognitive" about clay sculpturing. We looked for the relationships between the subjects of the clay scale and the various standardized cognitive tests. A correlation matrix was produced which showed the relationships between each of the pretest scores in clay and the pretest scores of all the standardized cognitive tests of the 326 children in the Phase II sample. Table 8 presents the correlation between the subtests of the clay scale and the standardized cognitive tests:

Clay Verbs

Embedded Figures

Wechsler Preschool Primary Scale of Intelligence (Verbal I.Q.)

Harris-Goodenough Drawing Test

The correlations formed a consistent pattern relating eight subtests of the clay scale to the tests which measure verbal and cognitive achievement. Most of these correlations reached significance at the .001 level of confidence. The subtests are:

Recognizability
Physical Details
Total Details*
Correctly Placed Details
Proportions
Whole Figure
Three-dimensional Details
Technique

From this point on, these subtests will be called the Cognitive Clay Scale.

These findings encouraged us to expect that a child's improvement in these aspects of clay achievement should be accompanied by his improvement in verbal cognitive achievement.

2. Within a given medium (clay), is it reasonable to expect transfer of learning from a subject taught (dog) to a subject not taught (person)?

To answer this question, we studied a random sample of 70 children, 34 advantaged and 36 disadvantaged, equally divided between pre-kindergarten and kindergarten. From the pretests of this sample a correlation matrix was produced to determine the relationship between the child's achievement in making a dog from clay and his achievement in making a person and in making an object of his choice (free clay). Table 9 presents the correlations between each subject in each of the clay scale subtests.

The highly significant correlations between the subjects (dog, person, and free) as seen in Table 9 indicate that the child transfers learning across subjects. Thus we would expect improvement as a result of intervention (teaching) to be transferred to untaught subjects as well as improving the subject we teach.

3. Within a given subject (i.e., dog or person), is it reasonable to expect transfer of learning from a non-verbal medium taught (clay) to a non-verbal medium not taught (drawing)?

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* Total Details consists of the Physical Details plus the Decorative and Background details. The latter two subtests had no correlation or a negative correlation with the cognitive tests. Therefore, hereafter, Total Details will not be included in discussion of the Cognitive Clay Scale.

TABLE 9 RELATIONSHIP OF COGNITIVE CLAY ABILITY IN MAKING THREE CLAY OBJECTS*

Cognitive Variables	SUBJECTS COMPARED					
	Person and Dog		Person and Free		Dog and Free	
	r	P	r	P	r	P
Recognizability	.60	.001	.26	.016	.33	.003
Details:						
Physical	.56	.001	.44	.001	.45	.001
Decorative	.36	.001	.36	.001	-.04	.371
Background	.19	.059	.04	.366	-.08	.260
Total	.56	.001	.39	.001	.42	.001
Correct Placement	.48	.001	NOT APPLICABLE IN FREE		NOT APPLICABLE IN FREE	
Whole Figure	.42	.001	.33	.003	.44	.001
3-Dimensional Details	.65	.001	.50	.001	.51	.001
Proportions (Rating)	.50	.001	NOT APPLICABLE IN FREE		NOT APPLICABLE IN FREE	
Proportions (Scale)	.41	.001	NOT APPLICABLE IN FREE		NOT APPLICABLE IN FREE	
Overall Technique	.60	.001	.55	.001	.48	.001
Height	.28	.010	.34	.003	.60	.001
Width	.63	.001	.23	.025	.38	.001
Time	.33	.004	.30	.005	.01	.474

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* Correlation of pretest scores across subjects (person, dog, free) in each clay subtest for a random sample of 70 preschool children - 34 advantaged and 36 disadvantaged.

To answer this question the pretest scores of the same sample of 70 children were compared to their pretest scores in drawing in each subtest of the three subjects: dog, person, and free. Table 10 presents the correlation in each of the three subjects between the subtest scores which are common to both the Cognitive Clay and the Drawing scales.

The subtests of the Cognitive Clay and Drawing scales in each of the three subjects are strongly related, except for Decorative and Background Details. The child's achievement in subtests which relate to cognition is consistent in two different art (non-verbal) media. Thus we can expect that improvement in the cognitive aspects of one non-verbal medium should be accompanied by improvement in the cognitive aspects of another non-verbal medium.

4. Within a given subject (i.e., dog or person), is it reasonable to expect transfer of learning from the non-verbal medium (clay) to the verbal medium (oral language)?

To answer this question the Cognitive Clay pretest scores of 200 children randomly selected from the Phase II population were compared to the pretest scores in Verbal Enumeration.

Table 11 presents the correlations of the person-plus-dog scores for the Cognitive Clay Scale with the person-plus-dog scores for the Verbal Enumeration.

Table 12 presents the significance of the correlations of the Verbal Enumeration subtests with the Cognitive Clay Scale. The table clearly shows that the clay subtests which relate to cognitive standardized tests (see Table 8) also correlate with the Verbal Enumeration tests.

The verbal subtests which represent fluency (Total Words and Different Words) correlate at .001 level of confidence. "Duplicates," which represent the child's tendency to "say" the same details as he "makes" in clay, was correlated with clay subtests, with coefficients ranging from .38 to .80. ($P < .001$)

Repetitions and Random Words which we assume to represent a lack of organization of thought do not correlate with the Cognitive Clay Subtests. "Association" and "Generalization" represent the child's method of organizing his recall of what he knows about a dog or person. "Organization" is the sum of the Association and Generalization scores. These subtests also correlate with the Cognitive Clay Scale at the .001 level of confidence.

We conclude that a child has a generalized cognitive capacity that is available to him when he represents what he knows in any medium--clay, drawing, or verbal.

We also may expect that if we intervene through one medium in a child's world to help him improve or develop that generalized cognitive capacity, he will have new resources at his disposal for representation in another medium.

TABLE 10 THE RELATIONSHIP OF ABILITIES IN COGNITIVE CLAY AND DRAWING INDICATED BY CORRELATIONS OF THE PRETEST SCORES IN THE TWO MEDIA FOR 70 4- AND 5-YEAR-OLDS RANDOMLY SELECTED: ADVANTAGED AND DISADVANTAGED

Variables	CLAY AND DRAWING					
	Person		Dog		Free	
	r	P	r	P	r	P
Responsibility	.60	.001	.58	.001	.21	.042
Details:						
Physical Details	.68	.001	.60	.001	.29	.007
Decorative Details	.01	.442	-.06	.307	-.08	.251
Background Details	-.07	.279	.07	.296	.11	.180
Total Details	.65	.001	.61	.001	.40	.001
Correctly Placed	.48	.001	.52	.001	Not Applicable	
Proportions	.62	.001	.59	.001	Not Applicable	
Technique	.42	.001	.49	.001	.42	.001
Width	.23	.027	.48	.001	.38	.001
Time	.35	.003	.38	.001	.38	.001

TABLE 11 CORRELATIONS: COGNITIVE CLAY PRETEST VS. VERBAL ENUMERATION PRETESTS

Number of Children = 326	Verbal Enumeration: Person Plus Dog															
Cognitive Clay: Person Plus Dog	Total Words		Repetitions		Different Words		Duplicates		Random Words		Associations		Generalizations		Organization	
	r	P	r	P	r	P	r	P	r	P	r	P	r	P	r	P
Recognizability	.27	.001	.02	*	.30	.001	.69	.001	.04	*	.18	.005	.23	.001	.27	.001
Physical Details	.37	.001	.11	*	.39	.001	.80	.001	.08	*	.28	.001	.32	.001	.38	.001
Decorative Details	.05	*	.002	*	.05	*	-.01	*	.10	*	.06	*	-.04	*	.01	*
Background	-.05	*	-.02	*	-.11	*	-.09	*	-.07	*	-.03	*	-.09	*	-.06	*
Total Details	.35	.001	.10	*	.35	.001	.75	.001	.07	*	.27	.001	.28	.001	.35	.001
Correctly Placed	.26	.001	-.03	*	.32	.001	.65	.001	.07	*	.23	.001	.21	.002	.27	.001
Proportions	.17	.01	-.05	*	.22	.001	.60	.001	-.02	*	.12	.05	.17	.01	.18	.01
Whole Figure	.11	*	.07	*	.08	*	.10	*	.16	.05	.01	*	.04	*	.01	*
3-Dimensional Details	.28	.001	.14	.05	.23	.001	.38	.001	.11	*	.18	.004	.22	.001	.26	.001
Height	.03	*	.04	*	.05	*	.15	.05	-.08	*	.07	*	.04	*	.07	*
Width	-.06	*	.10	*	-.12	.05	-.04	*	.05	*	-.09	*	-.14	*	-.14	.05
Technique	.18	.01	.06	*	.17	.01	.42	.001	.04	*	.12	.05	.09	*	.13	.05
Texture	.03	*	.02	*	.03	*	.01	*	.08	*	.03	*	.01	*	.03	*

* No Significant Correlation

TABLE 12

SIGNIFICANCE OF CORRELATIONS OF SELECTED COGNITIVE CLAY SUBTESTS WITH VERBAL ENUMERATION

Cognitive Clay: Person Plus Dog	Verbal Enumeration: Person Plus Dog							
	Total Words	Repetitions	Different Words	Duplicates	Random Words	Associations	Generalizations	Organization
	P	P	P	P	P	P	P	P
Recognizability	.001	----	.001	.001	----	.005	.001	.001
Physical Details	.001	----	.001	.001	----	.001	.001	.001
Total Details	.001	----	.001	.001	----	.001	.001	.001
Correctly Placed	.001	----	.001	.001	----	.001	.002	.001
Proportions	.01	----	.001	.001	----	.05	.01	.01
Whole Figure	----	----	----	----	.05	----	----	----
3-Dimensional Details	.001	.05	.001	.001	----	.004	.001	.001
Technique	.01	----	.01	.001	----	.05	----	.05

The Cognitive Clay Scale related to Picture Reading only in the T-units, an accepted method of assessing language development. Table 13 presents the correlations of T-units with the cognitive clay.

TABLE 13 CORRELATIONS: COGNITIVE CLAY PRETEST VS. T-UNITS IN THE LANGUAGE CHILDREN USED IN PICTURE READING PRETEST

	r	P
Recognizability	.24	.023
Physical Details	.35	.001
Correctly Placed	.28	.008
Proportions	.29	.006
Whole Figure	.11	NS
3-Dimensional Details	-.09	NS
Technique	.16	.090

The maturity level of the child's language is related to the generalized cognitive capacities he demonstrates in clay sculpturing.

We asked one more question concerning the cognitive clay scale.

> Is there a developmental progression in clay sculpturing, and if so will the Cognitive Clay Scale be sufficiently sensitive to change that it can measure "growth as the result of teaching"?

To answer this question, a random sample of 48 disadvantaged children (grades pre-kindergarten through second grade) was selected from children tested in Phase I. The mean scores of the Cognitive Clay Scale were tabulated by grade to determine if differences related to grade (age) would be evident. Table 14 presents the means of each subtest of the Cognitive Clay Scale for each grade.

TABLE 14

RANDOM SAMPLE OF 48 DISADVANTAGED CHILDREN
CLAY ASPECTS ACHIEVEMENTS IN THE DIFFERENT AGE GROUPS

	Pre-K N = 12	Kindergarten N = 20	First Grade N = 10	Second Grade N = 6
1. Recognizability	1.8	3.0	4.7	8.5
2. Physical Details	2.8	4.25	5.3	10.5
3. Decorative Details	0.2	0.1	0.3	0.7
4. Correct Physical Details	0.7	1.8	1.5	6.7
5. Proportions	3.1	2.4	0.2	3.3
6. 3-D Concepts	1.6	1.8	3.7	3.7
7. Whole Figure	5.6	5.9	6.5	6.2
8. Texture	2.0	1.9	2.2	2.0
9. Dimensions (size)	3.4	5.4	5.5	5.6
10. Time	5.7	8.5	7.0	7.2

The subtests that showed the greatest difference between pre-kindergarten and second grade are:

Recognizability
Physical Details
Correctly Placed Details
3-D Concepts

In some subtests, age in this small sample seemed to make little difference:

Proportions
Whole Figure
Texture
Dimensions (size)

In Phase II the Proportions and Whole Figure subtests were revised to be more precise in their assessment. In Phase II pretests, both of these subtests correlated with the standardized cognitive tests at the .001 level of confidence (Table 8). The analysis of the variance in Phase II shows a main effect of grade (age) on Proportions at the .012 level of confidence, and on Whole Figure at .042 level of confidence. The Whole Figure subtest measures the "uprightness" of the clay figure. Success in making a clay figure stand seems to be more related to knowledge of how to use the medium rather than some basic cognitive capability or maturity. However, the test does measure differences and growth in this subtest as a result of teaching technique as we shall see in the Phase II results.

In summary, the information derived from studies of the data from the 200 children's(grades pre-kindergarten through second grade) tests in Phase I of the project, plus the information gained from the pretests of 326 children (pre-kindergarten and kindergarten) in Phase II, leads us to the following conclusions:

A. The capabilities of a child which are assessed by the seven subtests of the Cognitive Clay Scale are related to the verbal and cognitive capabilities of a child which are assessed by our standardized cognitive tests and to our less formal verbal tests:

Recognizability - Level of ability to make a recognizable clay figure.

Physical Details - Number of physical details made on the clay figure.

Correctly Placed Details - Number of correctly placed details of the clay figure.

3-Dimensional Details - Number of 3-dimensional details on the clay figure.

Proportions - Level of ability to make a well proportioned clay figure.

Whole Figure - Level of ability to make the clay figure stand.

Technique - Level of ability to work with the clay in a manner appropriate to the medium.

B. A child has a generalized clay sculpturing capability which he utilizes across subjects.

C. A child has a generalized capability of non-verbal representation which he utilizes across media, i.e., drawing and clay.

D. A child has a generalized cognitive capability which he utilizes across both non-verbal and verbal media, i.e., clay, drawing, and oral language.

E. We may hypothesize that intervention in one medium and/or one subject to improve that general capability may be accompanied by improvement in other media related to that general capability.

F. The Cognitive Clay Scale is responsive to growth and development and we can expect that it will assess change as a result of intervention.

Development of the Sculptural Clay Scale.

Some educators and artists fear that by teaching cognitive concepts through an art medium one will sacrifice development of the child's artistic expression.

In the Continuation Proposal we stated that a scale would be developed by which we could monitor the effects of the cognitive intervention on the artistic performance of the children.

The Sculptural Scale was developed by the art teacher on the project staff. With the assistance of other art teachers as judges the reliability and validity of the scale was determined. The Sculptural Scale consists of an "overall score," a judgment made by evaluating the piece as a whole; five criteria subtests, each scored on a seven-point rating scale; and an average of the five scores. The subtests are:

Overall
Surface
Space
Unity
Expression
Utility
Average

The scale and full details of the development of the scale are in Appendix . A random sample of 30 children was selected for establishing of inter- and intra-judge reliability of the final form of the Sculptural Scale.

Using the Sculptural Scale, three judges scored the pretest and posttest photographs of each child's clay products of dog, person, and free sculpturing. When the judges' scores were compared, the percentages of near perfect agreement of all judges were all at least 67%, with most being at least 85%.

Intra-judge reliability was also tested. Using the Sculptural Scale, each judge was able to demonstrate the ability to assign equivalent scores with himself within a range of one point at least 90% of the time for all products.

Furthermore, the Overall Change Score by itself is a good indicator of growth in student sculptural achievement.

Designing the Intervention Program.

Smilansky's Israeli[8] study and Phase I data furnished some insights to assist us in designing the logistics of the intervention program that would "fit" the child. The foundation for some of those decisions is presented here.

Frequency and Length of Clay Sessions.

In the Israeli study, teachers taught with clay to small groups of children--six at a time. The interaction between teacher and child could be very personal and individualized. However, the scheduling of several clay groups each day of intervention (2 - 3 weeks) was difficult and impractical for teachers. In the U.S. study we decided to have the teachers work with the whole class twice a week for about 30 minutes each session. This pattern seemed to be realistic for classroom schedules and more nearly like regular school. Also, if we would find that children can develop through clay in a regular classroom setting, moving clay into the curriculum could be done with minimum adjustments for the teacher. Table 2 showed that disadvantaged children used considerably more time and made larger objects than advantaged children in the testing situation. Therefore, the 30-minute time limit was made flexible and could be lengthened at the discretion of the teacher. A minimum of 32 thirty-minute sessions was required.

What Subjects will be Used for Testing?

In Israel the children were asked to make a person and a dog for the pre- and posttests to determine growth in clay sculpturing capability. During intervention "person" was taught and "dog" was the test used to measure transfer. During Phase I of the Columbus project, persons who tested the disadvantaged children noticed some children's aversion to the subject "dog." These children had had unpleasant experiences with dogs, such as pets running away or being killed, or being afraid of dogs. Analysis of a sample of the data also confirmed that the young disadvantaged child may not have good "feelings" about making a dog from clay. For this reason, we decided to teach "dog" in order to introduce children to pleasant learning experiences with dogs--building a better attitude toward the subject--and to test transfer of having the child make a person. We also decided to have the child make an object of his choice in the first testing session as an expression of his ability when making an unprescribed object. This also was a time for the tester to build rapport with the child.

What Subjects will be Taught?

An analysis of the objects the children made, when they could choose their own subject during Phase I, gave us clues as to what subjects to teach during intervention.

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[8] Ibid., p. 21.

The sequence was determined by rationalizing which objects are the easiest and which are the hardest to sculpture in clay. We also considered what objects are more appropriately represented in the medium of clay.

Also, we built in a "cumulative" effect so that skills used in one subject could be used and added to when sculpturing the next subject(s). The following list was used:

List of Subjects for Intervention

1. Free
2. Pottery - Bowls
3. Foods (that could fit in a bowl)
4. Dog
5. Dog plus Food plus Pottery
6. Birds
7. Birds and Nest
8. Free (Integrate)
9. Farm Animals - Pets - Domestic Animals
10. Vehicles (could relate to farm)
11. Pottery - Vases
12. Zoo Animal
13. Zoo Animals plus Environment (rocks, trees, bushes, etc.)
14. Furniture
15. Houses plus Dog
16. Free (Integrate)

Summary of Phase I.

Phase I of the project was to develop tests and design instructional strategies for a year of experimental teaching of disadvantaged children with clay (Phase II).

Two hundred three boys and girls (pre-kindergarten through second grade) were tested by having them make three objects with clay: person, dog, and a free choice. The objects were evaluated on the basis of the Clay Observation Scale. Test-retest reliability was established and the validity of the scale was determined on the basis of content by experts and by its correlation with standardized tests. Tests of drawing and of verbal/cognitive abilities were devised and/or selected to form a testing package to assess change as a result of intervention.

A Sculptural Clay Scale was devised to assess the sculptural ability of the children from the artistic point of view in order to monitor the effects of cognitive intervention on artistic ability.

Intervention strategies were developed based on the findings of Phase I and from the experiences and findings of Smilansky's Israeli study. Time to be devoted to teaching and subjects to be tested and taught were determined from these data.

E. PROJECT OUTCOMES: PHASE II - INTERVENTION

Experimental Teaching of Disadvantaged Preschool Children through the Medium of Clay.

The second year efforts of the project focused on implementing the intervention techniques in clay sculpturing in pre-kindergarten and kindergarten classes of disadvantaged children. The purpose of this year's work was to determine the viability of using clay modeling as a medium of instruction for young children in developing verbal and cognitive as well as sculptural abilities. This section of the report is organized as follows:

I Description of the Study
    A. Sample Selection
    B. Performance Objectives Related to Teachers:
        Instrumentation and Monitoring of Teachers
        Training the Teachers to Teach with Clay
    C. Performance Objectives Related to Children:
        Instrumentation and Assessing of Children
        Intervention: Teaching Children with Clay

II Research Questions and Findings

I Description of the Study

Although we believe that clay sculpturing can be useful to any child, the main focus of this study was upon the disadvantaged child who has a gap between his learning in his home environment and the expectations of the public school. We also wanted to involve several schools for two reasons: first, to control for teacher effect; and second, to involve many teachers in a new idea making them partners in our research and bringing the benefits of the study directly into the schools.

A. Sample Selection.

The schools eligible to be selected were Title I designated schools, which meant that each of the schools had a high concentration of children whose families receive aid for dependent children (ADC). The school also had to have both pre-kindergarten and kindergarten classes which were not involved in other preschool experimental programs. The final criterion for inclusion in the project were the interest of the principal, the preschool teachers, and their willingness to participate in the project. Of the 29 schools which were approached, 27 were included in the study. Thirty-nine teachers and their classrooms were included in the intervention studies; 14 were selected for the control group. All intervention schools had both pre-kindergarten and kindergarten classes involved in order to facilitate supervision of the intervention. A few schools were paired to provide pre-kindergarten and kindergarten classes within the control group.

In order to test the central problems of the study, four groups of children were selected. Each group included four- and five-year-old children in the selected schools. In order to control for contamination between groups, the evaluation department of the school system clustered the schools we had selected into four groups which were geographically divided by school regions. To assure similar populations within each group, the clusters were arranged to include a similar range of percentage of ADC in each group as illustrated in the following table:

Intervention Group	Number of Schools	Range of Percentage of ADC
Encouragement	6	39% - 70%
Observation and Discussion	6	40% - 75%
Technique	6	38% - 73%
Control	9	38% - 81%

The control group had the widest range of ADC population, 38% - 81%, and the widest range of minority distribution - 1% to 99% minority. This group included 9 schools, 14 teachers, and therefore seems to be a realistic cross section of disadvantaged population of the city. The other three treatment groups were assigned randomly to the remaining clusters of the schools. Final selection consisted of 27 schools with 53 classrooms participating. Approximately 1,600 children were involved in these classrooms.

Although all children in each classroom participated in the intervention, only a sample of 10 - 12 children was randomly selected from each participating classroom to be tested. Further criteria for selection of children included age. Pre-kindergarten children had to be between the ages of 48 and 68 months; kindergarten children had to be between the ages of 68 and 72 months. Children who had been judged by teachers to have severe handicaps or disturbances were eliminated from the study. The goal was to test 128 children with equal numbers of boys and girls, pre-kindergarten and kindergarten, in each intervention and control group; a total of 512. Actual number of children pretested was 504. This number was allowing for a large margin of attrition.

Three hundred twenty-six children were posttested:

Eighty-one in the encouragement group;
Eighty-three in the observation-discussion group;
Eighty-five in the technique group; and
Seventy-seven in the control group.

Table 15 gives a complete description of the posttest distribution.

TABLE 15 NUMBER OF CHILDREN PRETESTED AND POSTTESTED IN EACH INTERVENTION GROUP, GRADE, SEX

GROUP	PRE-KINDERGARTEN			KINDERGARTEN			
	Boys	Girls	Total Pre-k.	Boys	Girls	Total Kdg.	Total Intervention Group
ENCOURAGEMENT	18	21	39	22	20	42	81
OBSERVATION/ DISCUSSION	22	22	44	20	19	39	83
TECHNIQUE	23	17	40	20	25	45	85
CONTROL	19	20	39	18	20	38	77
TOTAL BY GRADE AND SEX	82	80	162	80	84	164	326

Three hundred twenty-six children were posttested, 162 pre-kindergarten and 164 kindergarten children; 162 boys and 164 girls. This table shows the numbers in each group and each cell. The statistical procedure to be used handles unequal numbers.

Natural attrition accounted for 64 children being eliminated from the project:

> Fifty-four children left the classrooms because their families moved from the neighborhood or because they were transferred by the public school system to alleviate overcrowded classrooms.
>
> Seven children were placed in All Day Kindergartens after they had been pretested.
>
> Three children dropped out of school.

Forty-six children were eliminated because of the following organizational reasons:

> Thirteen children were unable to complete the pretest battery because of absence during the four-day test sequence.
>
> Five children were dropped because of problems not detected in the screening before pretest.
>
> Seven children had excessive absences during the intervention. We removed them from the posttesting because it would not measure the effects of the intervention.
>
> Twenty-one children were in classrooms which were not included in the final analysis because their teachers had not administered the proper intervention. (See page 59.)

Seventy-four children were randomly deleted because we did not have money for staff to posttest all of the children remaining in the pretested sample.

B. Performance Objectives Related to Teachers.

Four performance objectives were developed relative to teachers (including the substitute teacher testers):

1. Given the opportunity to participate in the training sessions and the project, teachers will be able to administer tests of clay modeling, drawing, and verbal cognitive abilities to the satisfaction of the training personnel on the basis of observation and content analysis of the observation data during the process of the training.
2. Given the opportunity to participate in the training sessions and the project, teachers will be able to evaluate and inter-

pret results of pre- and posttests in clay modeling, drawing, and verbal cognition, according to the guidelines established for scoring of rating scales, measured against standards of inter-judge reliability established in the Phase I standardization process, to the satisfaction of the evaluator.

3. Given the opportunity to participate in the training sessions and the project, teachers will be able to use the teaching strategies given them in the training sessions to provide the particular intervention required for their assigned treatment group to the satisfaction of support personnel visiting and monitoring each teacher in the treatment method, post-training and during intervention treatment with the children.

4. Given the opportunity to participate in the training sessions and the project, teachers will be able to develop a positive attitude toward the use of clay in the classroom and its purpose in the development of cognitive, language, and artistic abilities of preschool children as measured on a pre-post structured scale at a level established by the evaluator, pre-training, pre-intervention, and post-intervention.

Instrumentation and Monitoring of Teachers.

The monitoring instruments relative to the teacher performance objectives are listed below:

Instruments*	Purpose
Instrument Training Session Checklist	Document mastery of test administration skills; document ability to evaluate and interpret data from test administration
Clay Modeling Observation Scale and Drawing Observation Scale	Collect reliability data from practice test administration
Verbal Cognitive Program Intervention Checklist	Document mastery of skills for implementing intervention
Verbal Cognition Program Intervention Observation Scale	Document degree to which intervention is implemented
Attitude Toward Clay as a Medium Scale	Determine teacher attitudes toward clay activities

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*Instruments used are in Appendix C.

These monitoring instruments were administered during the training and/or implementation phases of the project using an administration schedule that varied from instrument to instrument. The project evaluator or the project staff was responsible for collecting the data from these instruments.

Intervention Monitoring Information.

The results concerning the attainment of objectives 1 through 4 have been previously reported to the State Department of Education through the required Title III monthly reports. Therefore, supportive data for those reported results are not included in this report.

Performance Objective 1.

This objective states that:

> Given the opportunity to participate in the training sessions and the project, teachers will be able to administer tests of clay modeling, drawing, and verbal cognitive abilities to the satisfaction of the training personnel on the basis of observation and content analysis of the observation data during the process of the training.

Part I of the Instrument Training Session Checklist was used to measure the attainment of this objective. It was intended to document when a substitute teacher examiner was ready to administer the instruments contained in the student assessment package. Each examiner was observed closely by the project staff during the training sessions. Each examiner was assessed and results recommended on a checklist of criteria relating to the social and technical readiness of the examiner for administering the package of tests. At the end of the training program, the project staff used the checklist to indicate areas in which examiners were not prepared.

Results showed that at the end of training no examiner was considered to be unprepared for administering the testing package. Each had demonstrated the ability to:

1. make the child feel at ease during the testing
2. encourage the child to respond freely
3. ask questions in a manner to convey confidence in the child's ability
4. praise and encourage the child with a natural, supportive voice and vocabulary
5. enter the child's responses during the testing in the correct place on the various forms
6. explain the testing procedure to the child
7. organize materials and follow the testing directions
8. attend to any time limitations during testing

Performance Objective 2.

This objective states that:

> Given the opportunity to participate in the training sessions and the project, teachers will be able to evaluate and interpret results of pre- and posttests in clay modeling, drawing, and verbal cognition according to the guidelines established for scoring of rating scales, measured against standards of inter-judge reliability established in the Phase I standardization process, to the satisfaction of the evaluator.

This objective referred to two basic issues: (1) if the examiners were able to evaluate and interpret children's responses to the assessment package; and (2) if examiners were able to produce reliable results on the clay modeling and drawing ability instruments.

Part II of the Instrument Training Session Checklist was used to docuent when an examiner was able to satisfactorily evaluate and interpret data obtained from the testing instruments. Using an appropriate checklist of criteria, each examiner was carefully monitored during practice administrations of the instruments. At the end of the training program the project staff used the checklist to indicate areas in which examiners were not prepared.

Findings.

Analysis indicated that at the end of training each examiner was considered to be prepared. All examiners could satisfactorily:

1. figure total scores correctly for all instruments
2. use available space on the instrument to record subjective statements of the child's process during the testing situation
3. indicate the child's responses using the appropriate category on the instrument
4. record objective responses compatible with the subjective statements of the child's process

The Clay Modeling Observation Scale and the Drawing Observation Scale were used to collect actual data from practice administration sessions near the end of examiner training to determine inter-judge reliability. Results from the Clay Modeling Scale indicated that all subsections of the instrument yielded inter-rater agreement values meeting or exceeding the critical value except for the Physical Details data. The value obtained ($r = .34$) was far below the minimum desired level. Therefore, examiners were rechecked following additional training. Two subsequent reliability checks, one in November and a second in February prior to posttesting, produced reliability estimates both of the magnitude +.97. Reliability of data across examiners for the Clay Modeling and Drawing Observation scales was, then, substantiated on all major areas of assessment.

Performance Objective 3.

This objective states that:

> Given the opportunity to participate in the training sessions and the project, teachers will be able to use the teaching strategies given them in the training sessions to provide the particular intervention required for their assigned treatment group to the satisfaction of support personnel visiting and monitoring each teacher in the treatment method, post-training, and during intervention treatment with the children.

Two instruments were used to respond to this objective which concerned the mastery and implementation of the intervention strategies on the part of participating classroom teachers. The Verbal Cognition Program Intervention Checklist was used to record when a teacher had acquired the skills necessary to implement the instructional strategy accompanying his/her assigned intervention. Each teacher was monitored at the end of the training session and early in the intervention period by a member of the project staff using the aforementioned checklist. (A description of the training procedures is presented on page 57.)

Findings.

> The results showed that 78 percent of the total number of teachers being trained had mastered the designated skills for successful intervention early in the training/intervention period. The remaining 22 percent or nine teachers, who were judged to be in need of additional training, were identified and monitored carefully through staff observation. Although more teachers in the technique group experienced some difficulty than did teachers in the less complex interventions, there were no common areas of weakness across all groups.

The Verbal Cognition Program Intervention Observation Scale was used to document the degree to which each teacher implemented the assigned instructional strategy in the fashion prescribed in the training session. Each teacher was observed by a member of the project staff at least twice during the intervention period with the first observation coming after the first three or four weeks of implementation. These teachers assigned to the technique group were observed more frequently than the other groups; the complexity of the technique strategy necessitated the additional observations.

Findings.

> Results showed that at each observation time for each group of teachers at least 58 percent were implementing the assigned strategy as prescribed. The number of teachers who were implementing the strategy but at times also using some inappropriate practices decreased or remained the same with each succeeding observation.

Based on the content analysis of data from the aforementioned scale, three teachers, one from each intervention group, were identified who were consistently not implementing the prescribed strategy as intended. In order not to jeopardize the experimental nature of the project by including students who were considered not to have received the intended experimental treatment, students taught by these three teachers were excluded from the final analysis of data even though these students had been posttested.

Performance Objective 4.

This objective states that:

> Given the opportunity to participate in the training sessions and the project, teachers will be able to develop a positive attitude toward the use of clay in the classroom and its purpose in the development of cognitive, language, and artistic abilities of preschool children as measured on a pre-post structured scale at a level established by the evaluator, pre-training, pre-intervention, and post-intervention.

The objective proposed to ascertain any changes in teachers' attitudes toward the use of clay. The Attitude Toward Clay as a Medium Scale was used to measure the attainment of the objective. The scale was administered at three different times, pre-training, pre-intervention, and post-intervention, to those teachers and teacher aides who were involved with implementing the experimental treatments. The instrument was administered only one time to the control teachers and aides since they were not involved in training for or implementing any of the interventions.

Findings.

> Results showed, that although all groups achieved a positive attitude score at each testing time, scores obtained in the control group were higher than the corresponding scores in any of the experimental groups at any testing time. The results also showed no significant changes in attitude scores over time for any group. Teachers and aides appeared to have positive attitudes before the project began, perhaps due to the voluntary nature of their participation, and maintained these positive attitudes through the project.

Training the Teachers to Teach with Clay.

Three groups of teachers were trained to intervene in children's clay sculpturing, each group using one of the three methods of intervention.

The teachers of the control group received no information about clay intervention until the end of the experimental phase.

We had four major goals in training the teachers:

1. To alleviate their misgivings about the messiness of clay and the management problems in the classroom.
2. To develop with them a theoretical background for using clay as a medium of developing language and cognition.
3. To train teachers in each intervention group to use the particular method to which they were assigned.
4. To teach the teachers to assess the behavior of the child with clay and to decide; what does he need, how do I intervene?

Originally we planned to conduct a five-day workshop before school began. Delays in the Phase I analysis did not permit this schedule. The alternative plan consisted of one all-day workshop for the total group of teachers and aides to deal with management and theory which were common to all groups. In this workshop we gave the teachers and aides experiences in expressing a single concept (dog) in dramatic play, drawing, language, and clay.

This experience gave them the opportunity to "feel" for themselves the contributions and requirements of each medium in cognitive, affective, and psychomotor dimensions. We then had a basis for discussing the theoretical foundation of the project.

The clay experience was conducted in a manner that demonstrated the classroom management of the clay. At the same time, the teachers were having the opportunity to interact with the clay from the child's vantage point while being able to think about it and observe others from the teacher's point of view.

Subsequent small group seminars were conducted for the individual intervention groups. The three full time staff members each trained and supervised one of the intervention groups. The training sessions were held as needed for each group. The technique group required the most time because those teachers had to learn techniques of working with clay themselves, as well as techniques of teaching the children.

In each small group, the theory for their particular intervention method was clarified and teaching techniques were developed. Teachers were encouraged to feel that they were partners in the research and we were open to their suggestions and ideas within the parameters of the method.

We tried to help teachers see that they were not necessarily teaching something new, but that they were using a new medium to teach the objectives they were expected to teach anyway. We had to help them observe children working in clay to see different levels of development and to see how one could move in at the level the child was working on in order to help him develop a concept and move to a new level of representation. The manner in which they could "move in" depended on the intervention method.

Teachers in the Encouragement method group were taught ways to talk with a child about his work in a "reflective" response manner. The teacher might say, "You are really pounding that clay today so that it is very flat and smooth!" They could encourage the child to talk about his own work. The teacher was told tell or teach a child what to do, but to support the child in what he was doing and to encourage and reinforce the positive aspects of his work. When the child could not put language to his work, the teacher did it by naming objects and actions casually as he discussed it with the child. If the child had a technical problem, the teacher was to say something like, "You really figure things out well. I'll bet you can find a way to fix that." Much of the teacher training in this group was done in the individual classrooms by the project staff member demonstrating the method as she worked with the class and the teacher for a couple of sessions and discussing with the teacher situations in the classroom. Since the teacher gave no formal instruction and was not absorbed with a presentation, this method seemed very effective for this group.

The Observation/Discussion method involved a "curriculum" of topics. Therefore, the training sessions included both general and specific methods. The teachers were trained by following the general workshop with discussion of the theory of the observation/discussion method. They were presented with the idea that when you tried to make a dog out of clay, you found you needed to see a dog. The less experience you have had, the more difficulty you had in expressing the concept--the more generalized the concept of dog--the less differentiated the clay representation. Modeling creates a need to look, and the awareness and the looking increases the discrimination, differentiation, and better awareness of the relationship of parts of the dog. Modeling the second time tries out new perceptions and provides feedback as to accuracy when the sculptor compares his object with the real thing.

Therefore, if we give the child experiences with the subject, talk about the subject, and help to "look again," he will make a representation of his perception and learn how to observe, think, and solve the problems of modeling.

Teachers were given the subjects which were to be taught in the clay sessions. (See p. 46.) They worked in small groups to develop suggestions for ways to present the subject to children, considering the need to develop interest in the subject, to develop concepts, and to guide observation.

In the second small group session, the Observation/Discussion teachers as a group observed a small class of children working with clay and discussed their observations. They were given suggestions of concepts and objectives which could be taught in the clay sessions, activities and questions to help the child think, observe, compare, talk about the subject and about his own clay work.

For the third session, teachers brought the objectives which they were expected by the school to teach preschool children. They discussed how clay time could be used to implement those objectives. We showed them a videotape of children working in clay. These were not children from any of their classrooms so that none of the teachers were ego-involved. We observed children working, compared levels of work, watched their methods and approaches to clay, assessed development. We stopped the tape at various points to discuss possible alternative approaches to helping the child they had just viewed.

As each group began intervention, the project staff supervisor was present for the first session to help establish the management system. She went to the first session of the first topic to demonstrate or observe depending on the wishes of the teacher. Training continued on a personal basis in this group also.

Teachers in the Technique method group had more sessions for training and in smaller groups than the other two intervention groups. In addition to the above training procedure, these teachers were shown how to work with clay and actually experienced making from clay the various topics in the "curriculum." For example, for the subject "bowls" they were taught how to make a pinch pot. The teaching was done in a manner they could use with the children. They were given basic concepts of clay sculpturing so they could help the children when they had technical problems. In these training sessions the teachers also helped to plan the intervention procedure.

The theory developed with these teachers was that if the child knows how to deal with the clay medium, he then can be more free to develop the cognitive aspects of the task. The teacher was to guide the child with questions but could also show him "how," when the child could not make the clay do what he wanted it to do.

The project staff supervisor of the Technique group, an art teacher, worked closely with these teachers, continued training longer than the others, but like the others, left the teaching of the children to the classroom teacher.

Thus the teacher training was conducted prior to and during the intervention, with training techniques conducted according to the needs of the group. In this study our goal was to learn what happens to children when we use the medium of clay in various ways. Therefore our main concern with teachers was to help them find ways to do the intervention most effectively. In spite of all our efforts, three classrooms, one from each intervention group, were eliminated from posttesting because the monitoring system showed that these teachers were not using the appropriate interventions with their groups.

Some teachers were more successful than others in adapting to the research situation and requirements, but only the three actually seemed to violate the requirements.

C. Performance Objectives Related to Children.

Given 32 half-hour sessions of clay sculpturing, children in three treatment groups will demonstrate a statistically significantly greater improvement based on pretest and posttest data than the children in the control group in the following areas:

1. In their clay sculpturing achievement, both cognitively and artistically;
2. In their drawing achievement (transfer to another non-verbal achievement);
3. In their verbal cognitive achievements (transfer to verbal achievement).

Instrumentation and Assessing of Children.

Clay Cognitive and Artistic Assessment.

Two instruments were used to measure the attainment of this part of the objective, the Cognitive Clay Scale and the Sculptural Clay Scale.

The dog subject was specifically included in each intervention. This product was one of three required of all students on the pre- and posttest administrations of the Cognitive Clay Scale. These pre- and posttest dog products were then observed and rated by trained judges using the Sculptural Clay Scale.

The person subject was specifically not taught in any of the interventions. However, the person product was likewise required of all students, pre- and posttest, and data collected using both previously cited instruments.

Finally, each student was asked to produce a clay project of his/her own free choice at the pre- and posttest times. Again, this data was collected using both instruments cited above. The free choice product was not required to be the same for a child at both testing times. However, the free choice item was included to allow students to demonstrate their cognitive and artistic abilities free from the constraints imposed by a specifically required product.

To summarize, each student at each testing time was asked to produce a dog, the subject taught; a person, the test for transfer subject; and a free choice product. All were subject to evaluation according to the cognitive assessment areas of the Cognitive Clay Scale and the artistic areas of assessment of the Sculptural Clay Scale.

The Cognitive Clay Scale was utilized to assess the following areas:

1. Verbal activities of the child
2. Method of working with clay
3. Process patterns

4. Recognizability of product
5. Physical details
6. Decorative details
7. Background details
8. Correctly placed physical details
9. Three dimensional details
10. Texture details
11. Proportions of product
12. Whole figure or shape
13. Technique of using clay medium

The Sculptural Clay Scale was utilized to assess the following:

1. Overall score
2. Surface treatment
3. Sculptural space
4. Unity
5. Expression
6. Clay utilization

Drawing Cognitive Assessment.

Two instruments were used to measure the attainment of this part of the objectives, the Drawing Observation Scale and the Harris-Goodenough Drawing Test.

Each child was asked to draw a dog, a person, and a picture of their choice (free drawing). The drawing of each subject was done on a day when he did not have that subject in clay or verbal enumeration. This test was to measure the transfer from one non-verbal medium (clay) to another non-verbal medium (drawing).

The Drawing Observation Scale (see Appendix A) very closely approximated the Cognitive Clay Scale so that subtests between the two scales could be compared. The subtests that the two scales had in common were:

1. Recognizability
2. Number of physical details
3. Decorative details
4. Background details
5. Correctly placed details
6. Proportions
7. Height
8. Width
9. Technique
10. Texture

The Cognitive Clay Scale measured Three-Dimensional and Whole Figure which were not appropriate to a two-dimensional representation. The Drawing Observation Scale included Perspective which was intended to determine the child's ability to represent 3-dimensional concepts in a 2-dimensional medium.

The testers scored the Drawing Observation Scale. All of the person drawings were also scored by one psychologist staff member according to the Harris-Goodenough Draw-a-Man Test as a further measure of drawing achievement and as a measure of Performance I.Q. The Harris-Goodenough assessed the cognitive aspects of a child's drawing. The Drawing Observation Scale is based on the Harris-Goodenough but was adapted to coincide with the Cognitive Clay Scale and simplified to be usable by classroom teachers. The Drawing Observation Scale gave us subtest scores. The Harris-Goodenough provided a total drawing (performance) I.Q. score.

Verbal/Cognitive Assessment.

The assessment package for measuring the attainment of the performance objectives included a comprehensive set of verbal/cognitive instruments which comprised the major portions of the data collection instruments relative to student objectives. These instruments are listed below:

Clay Verbs Test
Test of Verbal Enumeration
Embedded Figure Test
Wechsler Preschool and Primary Scale of Intelligence (WPPSI)
Picture Reading Test

Summary.

The components of the total assessment package, for pre- and posttesting used to measure the effects of intervention through clay, are listed with their area of assessment:

Instrument	Area of Assessment
Sculptural Clay Rating Scale	Clay sculpturing artistic ability
Cognitive Clay Observation Scale	Clay sculpturing cognitive ability
Drawing Observation Scale	Drawing cognitive ability
Harris-Goodenough Draw-a-Man Test	Drawing cognitive ability and performance I.Q.
Clay Verbs Test	Comprehension and vocabulary development
Test of Verbal Enumeration	Concept development Verbal fluency and organization
Embedded Figure Test	Abilities in generalizing, differentiating and integrating
Wechsler Preschool and Primary Scale of Intelligence (WPPSI)	Verbal I.Q.
Picture Reading Test	Verbal fluency, language development, picture interpretation

All of these instruments were administered on a pre-posttested basis. Subjects were randomly selected from each classroom and administered the assessment package prior to their exposure to any clay activities. Substitute teachers from the Columbus Public Schools' eligible substitute list were hired and trained by the project staff to administer the instruments. Since the battery of instruments constituted such an exhausting effort for both the student and the tester, the administration of the tests per child was spread over four sessions. Following the completion of the sixteen weeks (32 sessions) of clay modeling intervention, students were posttested.

The project staff attempted to distribute testers over treatment groups and to vary the schools to which a tester was sent from pretest to posttest. The testing schedule was planned to minimize any systematic tester bias occurring in a treatment group. However, this goal was not completely realized. In the field implementation of the testing schedule some situations developed in which a tester's service was not adequately distributed across groups. Although this fact does have ramifications for the interpretation of student data, the success of the training procedures used with all testers can be viewed as lessening the impact on the results of the project.

Classroom Adjustment Assessment.

As one measure of the affective aspects of the child's development in clay, each teacher assessed the children on the Teacher's Scale of Classroom Adjustment. This scale, developed by Smilansky for studies in Israel, assesses cognitive, social, and emotional adjustment of the child. The teacher rates each child on a one to five scale for each of 18 subtests, 6 of which fall in each of the above categories. Scores are totaled for a Total Adjustment Score. These scores were used in analysis of the relationship of the child's classroom adjustment to his development in clay sculpturing. This instrument is on file in the Ohio Department of Education.

Testing the Children.

The substitute teachers and project staff pretested children in some schools in each teaching program group in September. As soon as the children in one school had been tested, the staff member assigned to supervise that school started the class on the intervention program, while the testers went on to another set of schools to test the children. Thus the intervention program was phased in over a period of about ten weeks. Posttesting proceeded in the same manner--classes having started in September phasing out first.

The substitute teachers tested each child over a four-day period. Photographs were taken of the clay products that the child had made while being tested. Pre-posttest photos were attached to the written data forms for comparison to see change and for checking the scoring of the clay products.

Teachers who did the testing also scored the tests. This gave us confidence that teachers can be taught to evaluate children's work with a good degree of reliability.

In one group we had a problem with the WPPSI pretesting. This discrepancy will be accounted for in the reporting of the results.

Implementation of Intervention: Teaching Children with Clay.

In order to answer our questions about intervention with clay, we needed a sample of children large enough to test various methods of intervention and to answer our basic questions about learning in various media. Smilansky's study in Israel had two intervention groups, and a control group, which had "school-as-usual." Clay activity was a fairly regular occurrence in most of the control classrooms but without direction from the teacher. The children used clay only as they usually did in their classrooms.

In the U.S. study we observed that most pre-kindergarten classrooms had only incidental use of clay or other sculpturing media. Most did not use it at all. One class in the group surveyed had used earth*clay once before. Therefore, we felt that the control group would measure for us the effect of maturation in regular schooling. In addition we needed a treatment group where the children would have clay on a regular basis with no instruction of any kind. The teacher would support the child in whatever he wanted to do with the clay. We wondered if just interaction with the clay and continued experience with it in a supportive atmosphere would in itself develop language and cognition in the child. If so, this would support the theories of non-intervention in art and also provide an easy means of intervention for developing children's abilities.

The other two intervention groups were similar to those of the Israeli study. In these groups the teachers were given a list of topics to use. A new topic was introduced each week in both of these groups. In both groups, objects, pictures, and activities were brought to the classroom and discussions were centered around the given subject.

In the observation/discussion group, the teachers gave the child guidance only through questioning and discussion, helping the child think how to solve his problems of sculpturing and supporting him in his success.

The theory in this group was that if the child is taught to observe, become aware, he will be able to represent his perceptions and ideas in clay. If he has to find his own way to make the clay represent his ideas, he is working to answer his own questions and needs and the "working out" of his learning in "problem-solving." He will not be restricted by being given a specific way to make something. He has to use his own creativity and thinking skills to develop his ideas.

In the technique intervention group, the teacher discussed the topic with the children, provided them with experiences similar to the discussion intervention group. In addition, the teacher gave the child demonstrations and instructions as to how to make the object, and how to make the clay do what he wanted it to do.

The rationale for this group was that if the child does not have to struggle with the medium, he is free to observe, to think, and is enabled to better represent his perceptions. Table 16 summarizes and compares the methods used in each group. More detailed description of the intervention process is in Appendix B .

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* Type of clay used in the Experimental Teaching Programs (see AppendixB).

TABLE 16 INTERVENTION DESIGN

CONTROL (9 Schools)	I ENCOURAGEMENT (6 Schools)	II OBSERVATION/DISCUSSION (6 Schools)	III TECHNIQUE (6 Schools)
Pretest	Pretest	Pretest	Pretest
No Treatment 16 weeks	Treatment 16 weeks 2 sessions/week 30-min./session	Treatment Same as Treatment I	Treatment Same as Treatment I and II
No teacher training nor intervention with children	Provide Clay Child given: encouragement in whatever he does with the clay	Provide Clay Child given: encouragement topics experiences observation and discussion	Provide Clay Child given: encouragement topics experiences observation discussion
			Technique Shows child specific techniques for working with clay
Posttest	Posttest	Posttest	Posttest

SKILLBUILDING

Look at the faces of these children
And then look at what they have done
Which creates such looks upon these faces.

These are very young children, four and five,
And they have been learning how to work with clay.
Please note: I said learning.
Someone, a caring, understanding and trained adult,
Has interacted with these children and helped them
Understand that in the world are substances
Which can be transformed into other shapes
Resembling reality real or imagined.
However, that transformation doesn't happen
Just because you wish it so; it must be coaxed
And assisted into being, and the skill
To make this happen can be taught.

What makes this teaching of skills more challenging
Is that each child already has developed certain skills
And no two children are exactly at the same developmental level.
So you can teach for generalization
But you intervene with each child specifically.
It is necessary for learning, however,
To discover what skills and understandings
The individual child already owns
Before attempting to help him own others.
Along with this, understand it is not
In books or diagrams or little sheets alone
That learning can take place; try a piece of
Soft earth clay, which, when used for more
Than therapy or expression or muscle building
Can become a tool for exploration, idea building,
Planning, generalization, categorizing,
Concept clarifying, interpretation, evaluating,
Interrelating, discovering, studying.

Then look again at the faces
Which say to us who think we are in control,
"WE are ready to learn. Will you help us?"
And then make that learning so enjoyable
It doesn't need sugar coating or a make-up job,
Or, later on, plastic surgery.

---Judith Hagan

E: PROJECT OUTCOMES: RESEARCH QUESTIONS AND FINDINGS

Research Questions

The major objective of this study was to test the hypotheses implied in the following performance objectives for children:

> Given 32 half-hour sessions of clay sculpturing, children in three treatment groups will demonstrate a statistically significantly greater improvement based on pretest and posttest data than the children in the control group in the following areas:
>
> 1. In their clay sculpturing achievement, both cognitively and artistically;
> 2. In their drawing achievement;
> 3. In their verbal cognitive achievement.

For the convenience of research and reporting, these objectives were translated into the following research questions:

1. Does intervention through clay make a difference in the development of children's verbal cognitive achievement?
2. Does the method of teaching clay make a difference in the development of the children?
3. What type of clay teaching program is best for which type of children?

The findings will be reported in response to the questions. Tables in this section will be presented in a simplified form for the sake of clarity. Extensive tables are provided in the Appendix for persons interested in the detailed information.

Results

Question I: Does intervention through clay make a difference in the development of children's verbal cognitive achievement?

NOTE: In answer to Question I we combined the three different treatment groups into one Experimental Group. We could then compare the children who had clay, regardless of the method of intervention, with those who did not have clay, and thus answer the basic question, "Does use of clay make a difference?" Experimental Group in this section refers to the three combined treatment groups unless otherwise stated. Control Group always refers to the children who had no clay intervention.

Finding in re: Improvement in *cognitive clay achievement* of the
1:1 children in the Experimental Group as compared
with the Control Group.

Tables 17 and 18 compare the cognitive clay achievement of the Experimental Group with the Control Group. We see that out of 13 areas that we tested in the Cognitive Clay Scale, children gained significantly in 8 subtests. Five subtests had no significant change. The correlation between the Cognitive Clay Scale pretests and the standardized cognitive pretests in Phase I (Table 8) showed a similar pattern of relationships as we see in Tables 17 and 18. We kept the questionable items in the scale for Phase II, however, because we wanted to see if intervention would make some improvement in these areas. Now we see in Tables 17 and 18 that the tests which were not related to other cognitive tests also did not measure any significant change as a result of intervention.

On the basis of these findings, we made the following decisions regarding the selection of clay subtests to be included in the remaining analysis of the data and reporting of the results: *Decorative Details*, *Background Details*, *Texture*, and *Height* were not related to other cognitive tests and were not significantly changed by intervention. They will not be considered further in the major analysis of the results of this study of four- and five-year-old disadvantaged children. *Width* subtest did show a significant difference in gains between groups, but it had either no correlation or a negative correlation with the tests of cognition and will not be included in the further analysis. *Three-dimensional Details* will be included because it measured a significant gain in all groups, including the Control Group, and it correlates highly with the cognitive tests.

From now on we will consider the following subtests when we refer to the Cognitive Clay Scale:

Recognizability
Physical Details
Correctly Placed Details
Whole Figure
Three-dimensional Details (3-D)
Proportions
Technique

Table 19 summarizes the comparison of the achievement of the Experimental and Control groups on the selected subtests of the scale.

TABLE 17

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF EXPERIMENTAL GROUP AND CONTROL GROUP ON COMPLETE COGNITIVE CLAY SCALE -- PERSON + DOG

Cognitive Clay: Person + Dog	Experimental Groups N = 249						Control Group N = 77					
	Pretest		Posttest		Mean Gain	Sig. of Gain	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.			Mean	S.D.	Mean	S.D.		
Recognizability	6.30	3.62	9.18	4.07	2.88	.01	6.30	3.75	7.07	3.85	.77	*
Physical Details	8.70	5.20	12.55	5.62	3.85	.01	8.75	5.11	10.20	5.04	1.46	.05
Decorative	.25	.63	.53	1.06	.28	*	.30	.84	.36	0.69	.07	*
Background	.63	1.38	1.15	1.86	.52	.05	.44	1.06	0.97	1.47	.53	*
Total Details	9.58	5.51	14.22	6.60	4.64	.01	9.49	5.32	11.62	5.55	2.13	.05
Correctly Placed Details	3.43	3.44	5.67	4.18	2.24	.01	3.14	3.45	4.24	3.66	1.05	*
Whole Figure	9.24	2.66	10.10	2.35	.86	.05	9.23	2.70	9.07	2.12	-.17	*
3-Dimensional Details	3.84	3.54	6.15	4.38	2.28	.01	2.85	3.18	4.32	4.10	1.49	.05
Proportions	5.22	3.10	7.96	3.82	2.75	.01	5.20	3.10	6.24	3.57	1.09	.05
Technique	6.77	3.16	9.31	3.99	2.54	.01	5.60	3.08	7.16	3.50	1.45	.01
Texture	0.08	0.38	0.18	0.84	0.11	*	0.01	0.12	0.07	0.26	0.06	*
Height	7.52	4.10	7.72	3.50	0.14	*	7.92	3.48	8.33	3.62	.40	*
Width	8.01	3.92	8.76	3.70	.69	*	8.09	3.70	9.97	4.21	1.84	.05

* No Significant Gain

TABLE 18 MEAN GAINS. STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS UN COMPLETE COGNITIVE CLAY SCALE -- PERSON + DOG

Cognitive Clay: Person + Dog	Experimental Gains N = 249		Control Gains N = 77		Diff. Between Groups	Sig. of Diff.
	Mean	S.D.	Mean	S.D.		
Recognizability	2.88	3.65	.77	3.05	2.11	.003
Physical Details	3.85	6.17	1.46	5.31	2.39	.003
Decorative	.28	1.19	.07	1.08	.21	*
Background	.52	2.15	.53	1.64	-.01	*
Total Details	4.64	6.84	2.13	5.68	2.51	.005
Correctly Placed Details	2.24	4.15	1.05	3.26	1.19	.019
Whole Figure	.86	3.36	-.17	2.90	1.03	.018
3-Dimensional Details	2.28	4.64	1.49	3.88	.79	*
Proportions	2.75	3.57	1.09	2.86	1.66	.001
Technique	2.54	3.80	1.45	3.20	1.09	.022
Texture	0.11	0.44	0.06	0.26	.05	*
Height	0.14	4.91	.40	5.05	-.26	*
Width	.69	4.89	1.84	4.21	-1.15	.059

* No Significant Gain

TABLE 19 MEAN GAINS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS ON ABBREVIATED COGNITIVE CLAY SCALE

Selected Clay Cognitive Subtests Person + Clay	Experimental Gain (N=249)		Control Gain (N=77)		Diff. Between Groups	Sig. of Diff.
	Mean	S.D.	Mean	S.D.		
Recognizability	2.88	3.65	.77	3.05	2.11	.003
Physical Details	3.85	6.17	1.46	5.31	2.39	.003
Correctly Placed Details	2.24	4.15	1.05	3.26	1.19	.019
Whole Figure	.86	3.36	-.17	2.90	1.03	.018
3-Dimensional Details	2.28	4.64	1.49	3.88	.79	NS
Proportions	2.75	3.57	1.09	2.86	1.66	.001
Technique	2.54	3.80	1.45	3.20	1.09	.022

We see statistically significant differences between the Experimental and Control group in the subtests that concentrate on details, i.e., Recognizability and Physical Details ($P < .01$). We also see significant differences in the integrated areas: Correctly Placed Details, Whole Figure, Proportions, and Technique. ($P < .05$). Therefore, we can summarize and say that any intervention with children in clay helps children improve their cognitive achievement in the details of their expression in clay as well as in their achievement in integration.

Finding in re: 1:2 Improvement in sculptural (artistic) clay achievement in the Experimental Group as compared with the Control Group.

Some administrators and art teachers are concerned, and rightly so, about what intervention will do to artistic aspects of the child in an art medium like clay. Will "cognitive intervention" have a negative effect on the child's ability to express himself in the art medium?

The Sculptural Clay Scale was developed in order to monitor the effects of teaching (intervention) on the artistic growth of the child. The change in the child's artistic performance from pretest to posttest was assessed in two ways. First, the art teachers compared the photographs of the pretest product with the posttest product and assigned a "change score" on a scale of -3 to +3, 0 representing "no change." This scale was later translated into a continuum scale (1-7) for the computer. Table 20 presents the comparison of the mean change in sculptural achievement of the Experimental Group versus the Control Group and the significance of the difference between them based on the judges' evaluation of change.

Second, the art teachers evaluated the products of 200 children, randomly selected across all groups, by applying the Sculptural Clay Scale. Table 21 compares the change of the Experimental Group with the Control Group on the basis of the analysis of the five criteria or subtests of the Sculptural Clay Scale and the Overall score. "Change" in this table represents the computed difference between the pretest rating and the posttest rating on each subtest.

Both Tables 20 and 21 show that four- and five-year-old disadvantaged children in the Experimental Group improved in their sculptural achievement in the use of space, in the unity of the product, in their expressiveness in clay, and in utilizing clay as a medium. Only surface treatment did not change significantly. This finding coincides with the lack of development in Decorative and Background details assessed in the Cognitive Clay Scale, and may be related to the age of the children in this study. There is a statistically significant difference between the gains of the Experimental Group and the gains of the Control Group in their sculptural achievement in the subtests Space, Unity, Expression, and Utility, as well as in the Overall score ($P < .001$).

These findings confirm that intervention that improves disadvantaged pre-school children's achievement in clay cognition also improves children's clay achievement in sculptural or artistic aspects. If we intervene with children's clay, they become better not only from the clay cognitive point of view but also from the sculptural (artistic) point of view. They improve in their expression of detail (differentiation), in expression of the relationships of those details to the whole (integration), and at the same time the aesthetic qualities of the expression are improved.

Finding in re: 1:3 — Improvement in the cognitive clay achievement in subjects not taught as well as in subjects taught, in subjects prescribed and subjects of free choice.

If, as a result of intervention through clay, a child improves his ability to make the subject we teach (e.g., "dog"), will he also improve his ability to make other subjects in clay? In other words, does the child gain a generalized capability in clay which operates when he expresses subjects other than the one he was specifically taught to make?

TABLE 20

MEAN GAINS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS IN SCULPTURAL CLAY ACCORDING TO JUDGES' EVALUATION

Sculptural Clay: Person + Dog	Experimental Group			Control Group			Diff. Between Groups	Sig. of Diff.
	N	Mean Gain*	S.D.	N	Mean Gain*	S.D.		
Overall	226	1.69	1.99	76	0.41	1.80	1.28	.01
Surface	156	0.58	1.83	51	0.43	1.46	.15	NS
Space	156	1.60	2.43	51	0.35	2.17	1.25	.01
Unity	156	1.85	2.09	51	0.78	2.16	1.07	.01
Expression	156	1.90	2.59	51	1.16	2.34	.74	NS
Utility	156	2.16	2.36	51	0.94	2.25	1.22	.01
Average	156	1.65	2.04	51	0.82	1.87	.83	.01

* The mean gain has been transposed back to the -3, +3 scale the judges used.

TABLE 21

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF EXPERIMENTAL GROUP AND CONTROL GROUP ON SCULPTURAL CLAY SCALE AND COMPARISON OF GAINS

Sculptural Clay: Person + Dog	Experimental Group							Control Group							Diff. Between Groups
	Pretest			Posttest				Pretest			Posttest				
	N	Mean	S.D.	Mean	S.D.	Mean Gain	Sig.	N	Mean	S.D.	Mean	S.D	Mean Gain	Sig.	
Overall	226	5.05	1.72	6.92	2.22	1.87	.001	76	5.14	1.81	5.65	1.88	.51	NS	** 1.36
Surface	156	4.39	1.21	5.15	1.60	.76	.01	51	4.47	1.15	4.79	1.33	.32	NS	.44
Space	156	5.36	1.60	7.05	2.55	1.69	.001	51	5.18	1.79	5.42	2.00	.24	NS	** 1.45
Unity	156	5.41	1.71	7.48	2.40	2.07	.001	51	5.27	1.91	5.90	2.39	.63	NS	** 1.44
Expression	156	5.62	2.35	7.77	2.78	2.15	.001	51	5.55	2.23	6.50	2.65	.95	NS	* 1.20
Utility	156	5.32	1.81	7.46	2.56	2.14	.001	51	5.00	1.77	5.73	2.22	.73	NS	** 1.41
Average	156	5.00	1.68	7.09	2.16	2.09	.001	51	5.04	1.79	5.69	2.01	.65	NS	** 1.44

* = Significant at the .01 level of confidence.
** = Significant at the .001 level of confidence.

In order to answer this question, we taught the children about dogs during the intervention sessions, and the theme of dogs recurred several times throughout the 32 sessions. Although children sometimes made persons on their own in clay sessions, that topic was carefully avoided in the discussions and demonstrations, and they were never asked to make a person. The testing of clay ability required the child to make a dog (taught), a person (untaught), and an object of his choice which was "free clay" and obviously "untaught."

Table 22 presents the gains made in each subject by the two Experimental Groups (Discussion and Technique) which taught prescribed subjects in the intervention sessions. (Encouragement Group is not included here because the children were not taught any specified subjects in that group.) The gains of the two Experimental Groups are compared with the Control Group which had no clay instruction at all between pretest and posttest and only incidental exposure to the clay medium.

TABLE 22 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL GROUP AND CONTROL GROUP ON COGNITIVE CLAY SCALE FOR EACH SUBJECT: PERSON, DOG, FREE

Cognitive Clay Scale	EXPERIMENTAL GROUP GAIN		CONTROL GROUP GAIN		Diff. Between Group	Sig. of Diff.
	Mean	S.D.	Mean	S.D.		
	N = 168	DOG	N = 77			
Recogn.	2.18	2.34	.36	1.80	1.82	.001
Physical Det.	2.17	3.40	.48	3.17	1.68	.001
Correctly Pl.	1.49	2.62	.43	2.27	1.06	.001
Proportions	1.93	1.65	.47	1.32	1.46	.01
3-D	1.84	2.44	.66	2.45	1.18	.001
Whole Figure	1.07	2.02	.14	2.08	.93	.001
Technique	2.03	2.13	.65	1.66	1.30	.001
	PERSON					
Recogn.	1.35	2.23	.40	1.93	.95	.001
Physical Det.	2.05	4.10	.97	3.24	1.10	.029
Correctly Pl.	1.07	2.47	.63	1.77	.43	*
Proportions	1.06	1.60	.65	1.77	.41	*
3-D	1.28	3.22	.82	2.31	.46	*
Whole Figure	.29	2.06	-.31	1.74	.60	.020
Technique	1.23	2.37	.77	1.92	.46	*
	FREE					
Recogn.	1.48	2.79	.18	3.09	1.30	.002
Physical Det.	1.45	3.24	.99	2.90	.46	*
Correctly Pl.		NOT APPLICABLE				*
Proportions		NOT APPLICABLE				*
3-D	1.01	2.98	.56	2.02	.45	*
Whole Figure	.65	2.33	-.05	2.46	.70	.036
Technique	1.37	2.50	.60	2.11	.86	.015

* No Significant Gain

TABLE 23

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF EXPERIMENTAL GROUP AND CONTROL GROUP
ON COGNITIVE CLAY SCALE IN DOG, PERSON, AND FREE

Cognitive Clay	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
Dog	DISCUSSION/TECHNIQUE GROUPS (N = 168)					
Recogn.	2.92	1.96	5.10	2.35	2.18	.001
Physical Det.	4.17	2.76	6.33	3.21	2.16	.001
Correctly Pl.	1.85	2.07	3.35	2.47	1.49	.001
Proportions	2.58	1.88	4.51	2.43	1.93	.001
3-D	2.01	2.04	3.84	2.19	1.84	.001
Whole Figure	4.64	1.66	5.71	1.48	1.07	.001
Technique	3.18	1.73	5.21	2.25	2.01	.001
	CONTROL GROUP (N = 77)					
Recogn.	3.07	1.89	3.48	2.07	.36	*
Physical Det.	4.27	2.62	4.76	2.53	.48	*
Correctly Pl.	1.62	1.82	2.05	2.11	.43	*
Proportions	2.77	1.81	3.23	2.02	.47	*
3-D	1.55	1.74	2.22	2.36	.66	*
Whole Figure	4.60	4.36	4.74	1.50	.14	*
Technique	2.91	1.60	3.62	1.75	.71	.05
Person	DISCUSSION/TECHNIQUE GROUPS (N = 168)					
Recogn.	3.25	2.29	4.60	2.44	1.35	.001
Physical Det.	4.43	3.26	6.48	3.52	2.07	.001
Correctly Pl.	1.64	1.87	2.71	2.50	1.07	.001
Proportions	2.51	1.99	3.56	2.02	1.06	.001
3-D	2.03	2.35	3.30	2.69	1.28	.001
Whole Figure	4.53	1.56	4.81	1.41	.29	.074
Technique	3.34	1.89	4.57	2.33	1.23	.001
	CONTROL GROUP (N = 77)					
Recogn.	3.23	2.03	3.64	2.13	.40	*
Physical Det.	4.47	2.98	5.44	3.24	.97	*
Correctly Pl.	1.52	1.93	2.17	2.11	.63	.05
Proportions	2.43	0.57	3.03	1.47	.65	.05
3-D	1.29	1.71	2.10	2.37	.82	*
Whole Figure	4.64	1.64	4.33	1.36	- .31	*
Technique	2.77	1.68	3.53	2.06	.77	.05
Free	DISCUSSION/TECHNIQUE GROUPS (N = 168)					
Recogn.	3.50	2.52	4.98	2.50	1.48	.001
Physical Det.	2.67	2.49	4.11	2.81	1.45	.001
3-D	1.73	2.19	2.76	2.31	1.01	.001
Whole Figure	5.00	1.84	5.65	1.56	.65	.001
Technique	3.35	1.96	4.72	2.27	1.39	.001
	CONTROL GROUP (N = 77)					
Recogn.	3.44	2.59	3.62	2.42	.18	*
Physical Det.	2.13	2.34	3.12	2.73	.99	*
3-D	1.18	1.47	1.74	1.82	.56	*
Whole Figure	4.84	2.00	4.79	1.67	- 05	*
Technique	2.9[illegible]	1.80	3.45	2.05	.53	*

* No Significant Gain

Table 22 shows that the Experimental Group improved most in the taught subject (dog), but also made significant gains ($P < .001$) in making a person and subjects of their own choice. Table 23 shows that the Control Group made significant improvement in person in Correctly Placed Details, Proportions, and Technique ($P < .05$). The Experimental Group made higher scores in these variables than the Control Group, but the difference did not reach statistical significance.

Therefore we can say that intervention through clay improved the children's cognitive clay achievement in the subjects we taught them and also improved a generalized clay sculpturing capability which they used in expressing other subjects in clay.

Finding 1:4 *in re*: Improvement in drawing achievement of the Experimental Group as compared with the Control Group.

If we intervene in one non-verbal medium (clay), will the child also improve in another non-verbal medium (drawing)? In order to test drawing achievement, we evaluated the children's drawings by the Harris-Goodenough Drawing Test and the Drawing Observation Scale. In the Drawing Observation Scale, all groups, including the Control Group, made significant gains in drawing achievement in the cognitive areas when the scores of person and dog drawings were combined. In the subtests which assessed the details of the drawings and the technique, there were no significant differences between the Experimental Group and the Control Group. However, in the integrated areas, the Experimental Group made significantly greater gains than the Control Group, in Perspective ($P = .043$) and in Proportions ($P = .079$).

The Harris-Goodenough Drawing Test evaluated only the person drawings, which was the subject used to measure transfer in this study. This instrument is a standardized I.Q. test that uses in its evaluation of drawings many of the same areas that we used in our evaluation of the cognitive achievement in clay, i.e., physical details, decorative details, correctly placed details, proportions, etc.

Table 24 presents the achievement of the Experimental and Control groups and Table 25 compares the gains of the two groups.

TABLE 24 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF THE EXPERIMENTAL GROUP AND THE CONTROL GROUP ON HARRIS-GOODENOUGH DRAWING TEST

Group	N	Pretest		Posttest		Mean Gain	Sig. of Gain
		Mean	S.D.	Mean	S.D.		
Experimental Group	243	77.68	13.22	83.81	11.77	6.05	.01
Control Group	76	80.25	12.02	82.39	11.32	2.13	NS

TABLE 25 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUP ON HARRIS-GOODENOUGH DRAWING TEST

Drawing Test	Experimental Group			Control Group			Diff. Between Group	Sig. of Diff.
	N	Mean Gain	S.D.	N	Mean Gain	S.D.		
Harris-Goodenough	243	6.05	12.43	76	2.13	12.10	3.92	.029

The Experimental Group made greater gains in the Harris-Goodenough Drawing Test than the Control Group. The difference was significant at the .029 level of confidence. We see that the Experimental Group, which dealt with clay extensively through intervention, also showed some improvement in drawing. Although drawing is a different way of expression from clay, one being two-dimensional and the other being three-dimensional, by using similar means of evaluation we can see that intervention in one medium did influence achievement in the other medium. We can conclude from these findings that if we use with children a certain medium (in this case, clay) and if they learn certain concepts and/or skills in that medium, when they own those concepts or skills they will use them while expressing themselves in another medium. We did not teach any drawing in our intervention, but because the children improved in clay and learned things in clay they were able to express those things also in drawings.

Finding in re: Improvement of the verbal cognitive achievement of
1:5 the Experimental Group as compared with the Control Group.

We measured the verbal cognitive achievement of the children in five tests:

Clay Verbs
Duplicates (from the Verbal Enumeration Test: The number of details the child made in clay, person/dog, which he also said in his verbal description of the person/dog.)
Embedded Figures
Harris-Goodenough Drawing Test (an I.Q. test)
Wechsler Preschool and Primary Scale of Intelligence (WPPSI)

Table 26 shows the achievement of the Experimental Group and the Control Group in four of the above tests.

TABLE 26

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF EXPERIMENTAL GROUP AND CONTROL GROUP
IN VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	EXPERIMENTAL GROUP (N = 247)					
Clay Verbs	9.45	3.18	11.34	2.78	1.89	.01
Duplicates	4.95	3.41	7.12	3.93	2.18	.01
Embedded Fig.	50.14	10.45	50.26	10.21	.08	NS
H-G Draw. Test	77.68	13.22	83.81	11.77	6.05	.001
	CONTROL GROUP (N = 77)					
Clay Verbs	9.08	2.53	10.56	2.97	1.48	.01
Duplicates	3.15	9.94	6.29	3.63	1.31	NS
Embedded Fig.	50.47	10.31	48.99	9.25	-1.48	NS
H-G Draw. Test	80.25	12.02	82.39	11.32	2.13	NS

TABLE 27

MEAN GAINS AND t-TESTS:
COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUP
ON FOUR VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Experimental Group Gains	Control Group Gains	Diff. Between Groups	Sig. of Diff.
Clay Verbs	1.89	1.48	.41	NS
Duplicates	2.18	1.31	.87	NS
Embedded Fig.	.08	-1.48	1.40	NS
H-G Draw. Test	6.05	2.13	3.92	.029

In Table 26 we see that the children in the Experimental Group made statistically significant improvement in all of the verbal cognitive tests except Embedded Figures, while the Control Group's improvement reached significance on only the Clay Verbs. In Table 27 we see that the difference in improvement between the groups was not significant in Clay Verbs, Duplicates, and Embedded Figures. However, on the Harris-Goodenough (a performance I.Q. test), the Experimental Group made significantly greater improvement than the Control Group ($P < .05$). The Experimental Group gained four points more than the Control Group on this I.Q. measure after intervention in clay.

Table 28 presents the gains of the Experimental Group and the Control Group on the various subtests and the total Verbal I.Q. of the Wechsler Preschool Primary Scale of Intelligence (WPPSI) individual intelligence test which we selected for use in this study. We discovered a problem in the pretesting of one of the experimental groups, necessitating deletion of the WPPSI results of that group. Therefore the means of the Experimental Group represent two intervention groups instead of three that are compared with the Control Group.

TABLE 28 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF THE EXPERIMENTAL AND CONTROL GROUPS ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI Subtests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	EXPERIMENTAL GROUP (N = 166)					
Verbal I.Q.	92.12	13.41	98.83	13.09	6.72	.001
Information	8.29	2.78	9.68	2.81	1.39	.001
Vocabulary	7.91	2.63	8.86	2.67	.94	.001
Arithmetic	9.28	2.52	9.67	2.24	.39	.036
Similarities	9.80	3.10	10.96	3.16	1.16	.001
Comprehension	8.61	2.81	10.00	2.98	1.38	.001
Picture Completion	10.08	3.08	11.14	2.71	1.05	.001
	CONTROL GROUP (N = 77)					
Verbal I.Q.	93.03	14.02	95.71	13.35	2.69	NS
Information	8.77	2.76	9.36	3.00	.60	NS
Vocabulary	7.95	2.41	8.46	2.26	.51	NS
Arithmetic	9.62	3.06	9.57	2.52	- .05	NS
Similarities	10.00	3.25	10.27	3.25	.27	NS
Comprehension	8.22	2.77	9.31	3.66	1.09	.01
Picture Completion	11.29	3.06	11.76	3.19	.48	NS

Table 28 shows that the Experimental Group made significant gains at least at the .001 level of confidence on all the WPPSI subtests except Arithmetic, while the Control Group made no significant gains in any subtest except Comprehension. The Experimental Group made over 6 points mean gain in Verbal I.Q., significant at the .001 level of confidence.

Table 29 presents the comparison of the WPPSI Subtest scores of the Experimental Group and the Control Group. The greatest difference between the groups among the subtests of the WPPSI was in Similarities which is considered to be one of the better measures of intelligence. The difference between the groups in total Verbal I.Q. was 4 points which corresponds to the difference seen in Table 27 on the Harris-Goodenough Test.

TABLE 29 MEANS, STANDARD DEVIATIONS, AND t-TESTS:
COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS
ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI Subtests	Experimental Group N = 166		Control Group N = 77		Diff. Between Groups	Sig. of Diff.
	Gain	S.D.	Gain	S.D.		
Verbal I.Q.	6.72	9.65	2.69	10.20	4.00	.001
Information	1.39	2.21	.60	2.65	.79	.05
Vocabulary	.95	2.67	.51	2.53	.43	NS
Arithmetic	.39	2.39	- .05	2.88	.46	NS
Similarities	1.16	3.23	.27	3.19	.89	.05
Comprehension	1.39	2.75	1.09	2.37	.29	NS
Picture Completion	1.05	3.16	.48	3.00	.57	NS

To summarize the findings from the verbal cognitive testing, children who had clay intervention gained significantly in Verbal and Performance I.Q. We do not see significant differences in Clay Verbs, Duplicates, and Embedded Figures in Table 27. Later, we will see that there are differences when we consider the experimental children by the separate teaching programs and by considering pre-kindergarten and kindergarten children separately.

Therefore, we can say that although the intervention is in clay sculpturing, children also improve in their ability or achievement on standardized I.Q. tests, both performance and verbal, as well as in the clay medium. We can reaffirm that it does not matter through which medium a child develops cognition. If he improves through a non-verbal medium, he improves in his ability to express it in the verbal medium.

In summary of Findings 1:1 - 1:5, we compared the verbal and non-verbal cognitive achievement of the Experimental Group with children in the Control Group in clay, drawing, and verbal cognition.

We found that the children in the Experimental Group improved significantly in clay, both cognitively and sculpturally, in subjects taught and in subjects not taught. We did not teach drawing, but we found the Experimental Group also improved in drawing more than the Control Group. We looked at change in verbal cognitive ability and in some areas we found the Experimental Group significantly better than the Control Group, and in some areas they were not; later, we will see that the method of teaching makes the difference on this point.

Finding in re: Improvement in clay achievement, drawing, and verbal cognitive tests of pre-kindergarten and kindergarten children in the Experimental Group as compared with pre-kindergarten and kindergarten children in the Control Group.
1:6

Clay: Pre-kindergarten-Kindergarten

We know that the total Experimental Group moved significantly in cognitive clay ability as compared with the Control Group. Now we want to differentiate to see who improved relatively more, the pre-kindergarten or the kindergarten. Is clay better for cognitive development of younger children or older children?

Table 30 presents the mean gains in cognitive clay of the Experimental Group as compared with the Control Group by grade.

TABLE 30 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS ON THE COGNITIVE CLAY SCALE BY GRADE

Cognitive Clay: Person + Dog	Experimental Group		Control Group		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
	(N = 123)	PRE-KINDERGARTEN		(N = 39)		
Recogn.	2.55	3.38	1.00	2.97	1.55	.01
Physical Det.	3.46	6.04	1.26	5.22	2.20	.05
Correctly Pl.	1.71	3.32	.92	2.50	.79	NS
Proportions	2.11	2.81	1.10	2.56	1.01	.05
3-D	2.12	4.06	.82	3.57	1.30	.05
Whole Figure	1.00	3.70	- .44	3.02	1.44	.05
Technique	1.82	3.06	.84	3.08	.98	NS
	(N = 126)	KINDERGARTEN		(N = 38)		
Recogn.	3.21	3.87	.53	3.14	2.68	.001
Physical Det.	4.23	6.29	1.66	5.46	2.57	.05
Correctly Pl.	2.76	4.77	1.18	3.90	1.58	.05
Proportions	3.37	4.10	1.08	3.18	2.29	.001
3-D	2.44	5.16	2.16	4.10	1.06	NS
Whole Figure	2.72	3.00	.11	2.77	.61	NS
Technique	3.25	4.30	2.08	3.24	1.17	NS

Pre-kindergarten: In five out of seven cognitive clay subtests, the younger children in the Experimental Group improved significantly more than the Control Group. In the remainder, they were better but the difference was not significant.

Kindergarten: In four out of seven cognitive clay subtests, the older children in the Experimental Group improved significantly more than the older children in the Control Group. In the other three subtests, they improved more than the Control Group, but the difference was not significant.

The interesting finding is that the significant differences between the Experimental and the Control groups were not all in the same subtests for both grade levels. Both grades in the Experimental Group improved more than the Control Group in Recognizability, Physical Details, and Proportions.

The Experimental Pre-kindergarten improved more than the Control Pre-kindergarten in Whole Figure and 3-Dimensional Details. They evidently gained in their concept of the medium. The Experimental Kindergarten improved more than the Control Kindergarten in Correctly Placed Details--a skill requiring a sense of relationship of parts to the whole object.

When we compare the pre-kindergarten and kindergarten children within the Experimental Group, we see that the kindergarten children made greater gains in integrative cognitive clay skills, particularly in Correctly Placed Details ($P < .05$), Proportions, and Technique ($P < .01$). Table 31 shows comparison of the two grades.

TABLE 31 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF PRE-KINDERGARTEN AND KINDERGARTEN CHILDREN ON THE COGNITIVE CLAY SCALE

Cognitive Clay: Person + Dog	Exp. Pre-K. (N=123)		Exp. Kgn. (N=126)		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
Recogn.	2.55	3.38	3.21	3.87	.66	NS
Physical Det.	3.46	6.04	4.23	6.29	.77	NS
Correctly Pl.	1.71	3.32	2.76	4.77	1.05	.05
Proportions	2.11	2.81	3.37	4.10	1.26	.01
3-D	2.12	4.06	2.44	5.16	.32	NS
Whole Figure	1.00	3.70	0.72	3.00	- .28	NS
Technique	1.82	3.06	3.25	4.30	1.43	.01

We can summarize by saying that in the Experimental Group both Pre-kindergarten and Kindergarten made substantial gains in Cognitive clay. There was no significant difference between the grades in the gains in details. But the Kindergarten made significantly greater gains than Pre-kindergarten in the integrative subtests.

Younger children improved in their level of differentiation. The older children were ready to utilize the experiences to develop skills of integration when working with clay.

In Table 32 we compare the sculptural clay gains of the Experimental Group with the Control Group by grade. See the complete table of means from the evaluation on the Sculptural Clay Scale, Table 32A.

TABLE 32 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS IN SCULPTURAL CLAY* BY GRADE LEVEL

Sculptural Clay: Person + Dog	Experimental		Control		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
	(N = 73)		PREKINDERGARTEN (N = 29)			
Overall**	1.65	1.87	0.00	1.99	1.65	.01
Surface	0.47	1.71	0.00	1.55	.47	NS
Space	1.56	2.43	0.23	2.30	1.33	.01
Unity	1.85	2.24	0.19	2.32	1.66	.01
Expression	1.92	2.60	0.54	2.53	1.38	.01
Utility	2.11	2.22	0.50	2.47	1.61	.01
Average	1.56	2.02	0.39	2.00	1.17	.01
	(N = 84)		KINDERGARTEN (N = 23)			
Overall**	1.72	2.09	0.82	1.50	.90	.01
Surface	0.68	1.93	0.88	1.24	- .20	NS
Space	1.63	2.44	0.48	2.06	1.15	.01
Unity	1.85	1.97	1.40	1.83	.45	NS
Expression	1.88	2.60	1.80	1.98	.08	NS
Utility	2.20	2.48	1.40	1.94	.80	.05
Average	1.73	2.06	1.28	1.65	.45	NS

*Judges' evaluation of change
**Experimental PreK. N = 109 Control PreK. N = 38
**Experimental Kgn. N = 119 Control Kgn. N = 38

In Table 32 we see that in six of the seven sculptural clay subtests the Experimental Pre-kindergarten children improved significantly more than the Control Pre-kindergarten. Only Surface treatment did not improve significantly. In six out of seven subtests, the Experimental Kindergarten children improved more than the Control Group, and the difference reached significance in the Overall score, Space utilization, and Utilization of Clay as a medium. Surface treatment showed no significant improvement in either grade.

Disadvantaged pre-kindergarten children made significant achievement in sculptural clay as a result of intervention. If we look at the pre-kindergarten children in the Control Group, we see that they improved very little in the Sculptural Clay Scale. If we compare the pre-kindergarten with the kindergarten, it appears that intervention enabled the pre-kindergarten children to reach a level of achievement sculpturally on the posttest that the Control children reached a year later in kindergarten posttest. Table 32A.

The difference is smaller between the Kindergarten Experimental and Control groups because the Control Group at this age made more progress than the Pre-kindergarten Control Group. Thus, although the Kindergarten Experimental Group made significant gains, the difference between the Experimental and Control group did not reach significance.

TABLE 32A

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF EXPERIMENTAL AND CONTROL GROUPS BY GRADE ON SCULPTURAL CLAY SCALE

Sculptural Clay Subtests Person + Dog	N	Pretest		Posttest		Mean Gain	Sig. of Gain
		Mean	S.D.	Mean	S.D.		
EXPERIMENTAL PRE-KINDERGARTEN							
Overall	109	4.40	1.50	6.21	1.81	1.81	.001
Surface	73	4.26	1.07	4.77	1.44	.51	.020
Space	73	4.96	1.50	6.48	2.19	1.52	.001
Unity	73	4.85	1.59	6.58	2.14	1.73	.001
Expression	73	5.04	2.10	6.92	2.52	1.88	.001
Utility	73	4.78	1.54	6.67	2.10	1.89	.001
Average	73	4.66	1.51	6.36	1.75	1.70	.001
CONTROL PRE-KINDERGARTEN							
Overall	38	4.66	1.82	4.87	1.51	.21	*
Surface	29	4.48	1.27	4.45	1.27	- .03	*
Space	29	4.55	1.55	5.00	1.95	.45	*
Unity	29	4.76	1.75	4.69	1.73	- .07	*
Expression	29	4.93	2.00	5.34	1.72	.41	*
Utility	29	4.45	1.53	5.03	1.97	.59	*
Average	29	4.52	1.46	4.90	1.54	.38	
EXPERIMENTAL KINDERGARTEN							
Overall	119	5.63	1.70	7.40	2.36	1.77	.001
Surface	85	4.48	1.33	5.39	1.66	.91	.001
Space	85	5.71	1.61	7.39	2.72	1.68	.001
Unity	85	5.93	1.68	8.13	2.37	2.20	.001
Expression	85	6.12	2.47	8.28	2.81	2.16	.001
Utility	85	5.79	1.92	7.95	2.71	2.16	.001
Average	85	5.67	1.69	7.55	1.88	1.88	.001
CONTROL KINDERGARTEN							
Overall	38	5.71	1.61	6.42	1.91	.71	.016
Surface	23	4.52	1.04	5.22	1.31	.70	.023
Space	23	5.96	1.89	5.96	1.99	.00	*
Unity	23	5.96	2.03	7.43	2.23	1.48	.001
Expression	23	6.30	2.29	7.96	2.92	1.65	.002
Utility	23	5.70	1.94	6.61	2.23	.91	.021
Average	23	5.70	1.87	6.70	2.10	1.00	.013

* No Significant Gain

We can say in summary that intervention through clay benefited both younger and older children sculpturally, as well as cognitively. The younger children made improvement sculpturally ONLY when they had intervention, and then they made scores similar to the Control Kindergarten children who were a year older.

Drawing: Pre-kindergarten-Kindergarten

We wanted to find out what influence grade or age had on the children's transfer of learning from clay to drawing. Table 33 presents the achievement on the Harris-Goodenough Drawing Test of the pre-kindergarten and kindergarten children separately in the Experimental and Control groups. Table 34 compares the gains in each group by grade.

Both pre-kindergarten and kindergarten children in the Experimental Group made significant improvement in drawing ($P < .01$). Both grades in the Experimental Group made greater improvement than the Control Group, the difference in the kindergarten reaching significance at the .01 level of confidence (Table 34).

TABLE 33

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF EXPERIMENTAL GROUP AND CONTROL GROUP ON HARRIS-GOODENOUGH DRAWING TEST BY GRADE

GRADE	Experimental · N = 244					Mean Gain	Sig. of Gain	Control N = 76					Mean Gain	Sig. of Gain
	N	Pretest		Posttest				N	Pretest		Posttest			
		Mean	S.D.	Mean	S.D.				Mean	S.D.	Mean	S.D.		
Pre-Kindergarten	118	75.25	13.76	79.96	11.37	4.49	.01	38	79.00	13.21	80.69	9.83	1.63	NS
Kindergarten	126	79.97	12.32	87.56	10.97	7.51	.01	38	81.50	10.74	84.13	12.56	2.63	NS

TABLE 34

MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS ON HARRIS-GOODENOUGH DRAWING TEST BY GRADES

GRADE	Experimental			Control			Diff. Between Groups	Sig. of Diff
	N	Mean Gain	S.D.	N	Mean Gain	S.D.		
Pre-kindergarten	118	4.49	13.10	38	1.63	14.31	2.86	NS
Kindergarten	126	7.51	11.63	38	2.63	8.86	4.88	.01

TABLE 35 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUP ON THE DRAWING OBSERVATION SCALE

Drawing: Person + Dog	Experimental		Control		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
	PRE-KINDERGARTEN					
Recogn.	1.92	2.97	2.28	3.07	- .36	NS
Physical Det.	4.37	6.06	4.90	5.23	- .53	NS
Correctly Pl.	1.66	3.56	3.76	4.17	-2.10	.007
Proportions	1.68	2.38	2.54	2.67	- .86	NS
Perspective	.75	1.57	.21	.66	.54	.01
Technique	1.53	2.50	2.34	3.56	- .81	.047
	KINDERGARTEN					
Recogn.	2.13	2.71	1.50	2.41	.63	NS
Physical Det.	3.52	6.07	2.34	5.16	1.18	NS
Correctly Pl.	2.65	4.77	1.66	4.20	.99	NS
Proportions	2.75	3.02	.58	2.82	2.17	.001
Perspective	.89	1.99	.55	1.66	.34	NS
Technique	2.46	3.68	1.61	3.71	.85	.047

Table 35 presents the comparison of the groups by grade of the assessment of drawing on the Drawing Observation Scale. The Pre-kindergarten children in the Control Group made greater gains than the Experimental Pre-kindergarten in Correct placement of details and in Technique of drawing ($P < .05$). The Experimental Pre-kindergarten made significantly greater improvement in Perspective ($P < .01$) than the Control Group.

The Experimental Kindergarten children made more improvement than the Control Kindergarten in every subtest of the drawing scale. The difference was significant in Proportions ($P < .001$) and Technique ($P < .05$).

The Experimental Pre-kindergarten children were better than the Control Group only in the integrative area of Perspective. The Kindergarten children made more transfer from clay to drawing than the Pre-kindergarten children. The older children in the Experimental Group were also able to utilize what they had learned while working with the clay in expressing themselves in drawing. Thus, we see again that, although we did not teach drawing, the older children who had intervention through clay made gains also in drawing. The younger children seemed to learn what they were taught directly, but made less transfer. However, their improvement in Perspective suggests that the younger children improved in their ability to perceive and express the relationships within the dimensions of their surrounding environment.

Verbal Cognitive: Pre-kindergarten-Kindergarten

Table 36 presents the results of the verbal cognitive tests of the pre-kindergarten children in the Experimental Group and the Control Group.

TABLE 36 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF PRE-KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest		Posttest		Mean Gain	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
	PRE-KINDERGARTEN EXPERIMENTAL GROUP					
Clay Verbs	8.12	3.06	10.24	2.73	2.12	.01
Duplicates	3.55	2.88	5.83	3.63	2.28	.01
Drawing Test	75.25	13.76	79.96	11.37	4.49	.01
Embedded Fig.	49.43	10.25	49.95	10.34	.43	NS
	PRE-KINDERGARTEN CONTROL GROUP					
Clay Verbs	8.36	2.50	9.31	2.81	.95	NS
Duplicates	3.80	2.97	4.60	3.14	.80	NS
Drawing Test	79.00	13.21	80.69	9.83	1.63	NS
Embedded Fig.	53.56	11.60	50.59	9.16	-2.97	NS

Table 37 shows the comparisons of the verbal cognitive gains of the Pre-kindergarten groups.

TABLE 37 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF PRE-KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	EXPERIMENTAL GROUP		CONTROL GROUP		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
Clay Verbs	2.12	3.41	.95	2.51	1.17	.05
Duplicates	2.28	3.65	.80	3.74	1.48	.05
Drawing Test	4.49	13.10	1.63	14.31	2.86	NS
Embedded Fig.	.43	10.53	-2.97	11.12	3.40	NS

Table 38 presents the results of the verbal cognitive tests of the Kindergarten children in the Experimental Group and the Control Group.

Table 39 compares the verbal cognitive gains of the Kindergarten groups.

TABLE 38 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean Gain	S.D.	Mean Gain	S.D.		
	KINDERGARTEN EXPERIMENTAL GROUP					
Clay Verbs	10.73	2.75	12.42	2.38	1.67	.01
Duplicates	6.38	3.32	8.45	3.80	2.07	.01
Drawing Test	79.97	12.32	87.56	10.97	7.51	.01
Embedded Fig.	50.83	10.63	50.57	10.12	- .26	NS
	KINDERGARTEN CONTROL GROUP					
Clay Verbs	9.82	2.38	11.84	2.58	2.03	.01
Duplicates	6.21	2.90	8.04	3.32	1.83	.05
Drawing Test	81.50	10.74	84.13	12.56	2.63	NS
Embedded Fig.	47.11	7.50	47.25	9.17	.14	NS

TABLE 39 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	EXPERIMENTAL GROUP		CONTROL GROUP		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
Clay Verbs	1.67	2.75	2.03	2.32	- .36	NS
Duplicates	2.07	4.31	1.83	3.70	.24	NS
Drawing Test	7.51	11.63	2.63	9.82	4.88	.05
Embedded Fig.	- .26	11.49	0.14	8.73	.40	NS

We wanted to learn how the Experimental Group changed in their verbal cognitive areas in each grade. The first verbal cognitive area to be considered is Clay Verbs. We found that the Pre-kindergarten children improved significantly in Clay Verbs achievement and their gains were significantly higher than the Pre-kindergarten Control Group. The Kindergarten children in both the Experimental and Control groups improved significantly ($P<.01$) so that there was no significant difference between their gains.

The second verbal cognitive area to be considered is Duplicates, i.e., children expressing the same concept in verbal and non-verbal media. Again the Experimental Pre-kindergarten Group made significant gains which were statistically better than the Control Group ($P<.05$). The Kindergarten in both groups gained significantly. While the Experimental Kindergarten made larger gains than the Control Kindergarten, the difference between the groups did not reach significance. (Table 37.)

The third area we tested was the Performance I.Q. as measured by the Harris-Goodenough Drawing Test. On this test, both grades in the Experimental Group made significant improvement ($P<.01$). The Experimental Pre-kindergarten children gained three points more than the Control Pre-kindergarten (not significant), while the Experimental Kindergarten gained five points more than the Control Kindergarten, a difference which was significant at the .05 level of confidence.

The fourth area we tested was measured by the Embedded Figures test. There were no significant gains by either group and no significant differences between the groups at either grade level.

To summarize, we can say that on the verbal cognitive tests most related to the clay intervention, namely, Clay Verbs and Duplicates, the younger Experimental children made significantly greater gains than the younger Control children. On the standardized drawing test, which requires a medium we did not teach, the younger Experimental Group made gains, but not significantly greater than the Control Group. Among the older children, both groups made significant gains in the clay related tests, but only the Experimental Group made significant gains in the Drawing Test.

The last verbal cognitive test to be considered is the Wechsler Preschool Primary Scale of Intelligence (WPPSI) individual intelligence test of which we used only the Verbal I.Q. and the Picture Completion portions for our purposes of measuring verbal and cognitive growth. As in the discussion of the WPPSI in the previous section, Experimental Group includes the data from only two of the Experimental teaching programs.

Table 40 presents the achievement on the WPPSI Verbal I.Q. and each of the Subtests for the Pre-kindergarten Experimental and Control groups.

Table 41 compares the gains of the Pre-kindergarten groups on the WPPSI Verbal I.Q. and Subtests.

TABLE 40 MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF PRE-KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS
ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	PRE-KINDERGARTEN - EXPERIMENTAL GROUP (N = 79)					
Verbal I.Q.	87.73	11.54	95.26	10.78	7.52	.001
Information	7.33	2.15	8.79	2.41	1.46	.001
Vocabulary	7.35	2.36	8.04	1.98	.69	.021
Arithmetic	8.85	2.43	9.80	1.95	.95	.001
Similarities	9.33	3.22	10.52	3.16	1.19	.01
Comprehension	7.70	2.61	9.14	2.60	1.44	.001
Pic. Completion	8.91	2.99	10.73	2.63	1.82	.001
	PRE-KINDERGARTEN - CONTROL GROUP (N = 39)					
Verbal I.Q.	92.13	14.15	95.44	13.11	3.31	.041
Information	8.31	2.54	8.56	2.79	.26	NS
Vocabulary	7.54	2.42	8.72	2.41	1.18	.05
Arithmetic	9.54	3.25	9.82	2.36	.28	NS
Similarities	10.36	3.38	10.64	3.27	.28	NS
Comprehension	8.13	2.91	9.00	2.64	.87	.037
Pic. Completion	11.51	3.21	12.74	3.17	1.21	.05

TABLE 41 MEANS, STANDARD DEVIATIONS, AND t-TESTS:
COMPARING GAINS OF PRE-KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS
ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI	Experimental Group		Control Group		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
Verbal I.Q.	7.50	8.87	3.31	9.75	4.19	.026
Information	1.46	2.09	.26	2.59	1.20	.014
Vocabulary	0.69	2.63	1.18	2.88	- .49	NS
Arithmetic	0.95	2.18	.28	3.43	.67	NS
Similarities	1.19	3.33	.78	3.10	.91	NS
Comprehension	1.44	2.70	.87	2.52	.57	NS
Pic. Completion	1.82	2.94	1.21	3.25	.61	NS

Table 42 presents the achievement on the WPPSI Verbal I.Q. and each of the Subtests for the Kindergarten Experimental and Control groups.

Table 43 compares the gains of the two kindergarten groups on the WPPSI I.Q.

TABLE 42

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS
ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI Subtests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	KINDERGARTEN - EXPERIMENTAL GROUP (N = 87)					
Verbal I.Q.	96.10	13.40	102.22	13.08	6.12	.001
Information	9.18	3.00	10.49	2.90	1.32	.001
Vocabulary	8.43	2.77	9.60	2.99	1.17	.001
Arithmetic	9.66	2.57	9.54	2.49	- .12	NS
Similarities	10.73	2.94	11.37	3.13	1.14	.001
Comprehension	9.45	2.73	10.79	3.09	1.33	.001
Pic. Completion	11.15	2.77	11.52	2.74	.39	NS
	KINDERGARTEN - CONTROL GROUP (N = 38)					
Verbal I.Q.	93.93	14.00	96.00	13.78	2.05	NS
Information	9.24	2.93	10.18	3.02	.95	.05
Vocabulary	8.37	2.35	8.18	2.10	- .18	NS
Arithmetic	9.71	2.89	9.32	2.67	- .40	NS
Similarities	9.63	3.11	9.90	3.23	.26	NS
Comprehension	8.32	2.65	9.63	2.69	1.32	.001
Pic. Completion	11.03	2.92	10.76	2.92	- .26	NS

TABLE 43

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
COMPARING GAINS OF KINDERGARTEN EXPERIMENTAL AND CONTROL GROUPS
ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI Subtests	Experimental Group		Control Group		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
Verbal I.Q.	6.12	12.25	2.05	10.73	4.07	NS
Information	1.34	2.32	0.95	2.69	.39	NS
Vocabulary	1.19	2.69	-0.18	1.90	1.37	.002
Arithmetic	- .12	2.46	-0.40	2.18	.28	NS
Similarities	1.15	3.16	0.26	3.31	.89	NS
Comprehension	1.34	2.82	1.32	2.23	.02	NS
Pic. Completion	.37	3.22	- .26	2.54	.65	NS

Tables 40 and 42 show that the mean Verbal I.Q. of each grade level in the Experimental Group improved by six or seven points, a gain which is significant at the .001 level of confidence. At each level this gain was approximately four points greater than the gain of the Control Group. In the pre-kindergarten, the difference between the Experimental and Control group was significant at the .05 level of confidence (Table 41). In the kindergarten, the standard deviation was much greater in both groups, causing the difference not to reach statistical significance (Table 43). The Experimental Pre-kindergarten made significant gains in all the subtests except Vocabulary, and the Experimental Kindergarten in all subtests except Arithmetic. The greatest differences in gains between the Experimental and the Control groups for the pre-kindergarten were in Information and Similarities; for the kindergarten, in Vocabulary and Similarities.

Summary: Pre-kindergarten-Kindergarten

In this section, we have looked for the answer to our question, "Does intervention in children's clay activities enable different gains for pre-kindergarten than for kindergarten children?" We have combined all intervention groups as one Experimental Group for comparison with the Control Group. We wanted to know if work with clay makes a difference and if it has a different influence in Pre-kindergarten than in Kindergarten.

We found that clay is a good medium for pre-kindergarten as well as kindergarten children. We found that without some intervention in the child's clay activities, there was almost no gain in clay capability for either pre-kindergarten or kindergarten disadvantaged children. Generally speaking, intervention helped children improve:

1. In their clay capability (the medium that we taught).
2. In drawing capability (the medium we did not teach).
3. In verbal cognitive capability and in I.Q. (Verbal I.Q. 4 points difference and Performance I.Q. on the Drawing Test, 4 or 5 points difference).

So we can say that we have a way of developing non-verbal cognitive and verbal cognitive abilities in pre-kindergarten and kindergarten children through a non-verbal medium like clay.

To summarize the difference between pre-kindergarten and kindergarten in the Experimental Group, we found that the kindergarten children made greater gains in the integrative skills measured by the Cognitive Clay Scale. Both grades improved in discrimination and expression of detail. Both grades moved almost the same in the verbal cognitive areas. The kindergarten gained three points more than the pre-kindergarten in the Drawing I.Q., while in the other verbal cognitive areas, the pre-kindergarten children tended to gain slightly more than the kindergarten children.

The Pre-kindergarten children in the Experimental Group made significant improvement in every subtest of the WPPSI. The Kindergarten gains were significant except for Arithmetic and Picture Completion. The significant differences between Pre-kindergarten groups were in total Verbal I.Q. (4 points) and Information. The Experimental Kindergarten made greater improvement in Vocabulary than the Control Group.

These findings emphasize the importance of the process versus the importance of the product. Although the pre-kindergarten children's clay products did not express the level of development in integration that the kindergarten children were able to achieve, the pre-kindergarten children did make improvement in the target verbal and cognitive skills.

One explanation of the verbal cognitive growth of the pre-kindergarten Experimental children may be that the clay is of special value to the younger children because their verbal ability is so undeveloped that without a non-verbal medium they move very little or even lose, as we see in the Control Group. The kindergarten child, being a year older, has developed more verbal ability on which to build. However, the kindergarten child, who had the teaching with clay, also made significantly better gains in most areas than the Control Group. We also have to remember that the pre-kindergarten children in this group study are a selected low group of children, chosen for inclusion in a specially funded Pre-kindergarten Program for disadvantaged children who are lacking in basic experiences. A comparison of the pretest I.Q. scores of the pre-kindergarten and kindergarten children of our total population for the study (326) reveals that the pre-kindergarten began the school year 4 points lower than the kindergarten on the Harris-Goodenough I.Q., and 6 points lower than the kindergarten on the WPPSI Verbal I.Q.

Thus, we began with a verbally low group in the pre-kindergarten and teaching through the non-verbal medium of clay helped them make larger gains than the children who had no clay experiences. What is clear is that clay is a good medium to develop disadvantaged pre-kindergarten children as well as kindergarten children, and it helps not only in their gains and development of expression in clay, but it transfers to expression in drawing, in words, and it influences their I.Q.

Finding 1:7 in re: Improvement in clay achievement, drawing, and all other cognitive and verbal tests of the boys and girls in the Experimental Group as compared with the improvement of the boys and girls in the Control Group.

We are still considering the combined intervention groups as the Experimental Group for comparison with the Control Group. Now within these two groups we will observe the boys' achievement as compared with the girls' achievement in clay, drawing, and verbal cognitive skills.

Clay: Boys-Girls

In Table 44 we compared the clay achievement of all boys with all the girls in our population of 326 children. We see that both boys and girls made highly significant gains in their clay achievement. Table 45 shows that there was no significant difference between gains of the boys and the girls of the total sample.

TABLE 44

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF ALL BOYS AND GIRLS
ON COGNITIVE CLAY SCALE

Cognitive Clay Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
Person + Dog	BOYS (N = 162)					
Recogn.	5.96	3.55	8.60	4.03	2.64	.01
Physical Det.	8.00	4.77	11.19	5.39	3.19	.01
Correctly Pl.	3.01	3.27	4.96	3.74	1.95	.01
Proportions	4.93	3.00	7.51	3.90	2.58	.01
3-D	3.49	3.14	5.65	4.14	2.16	.01
Whole Figure	9.67	2.75	10.17	2.51	.50	NS
Technique	6.51	3.30	8.51	3.91	1.99	.01
	GIRLS (N = 164)					
Recogn.	6.63	3.71	8.76	4.20	2.13	.01
Physical Det.	9.42	5.46	12.79	5.64	3.37	.01
Correctly Pl.	3.71	3.58	5.71	4.42	1.98	.01
Proportions	5.49	3.17	7.61	3.77	2.12	.01
3-D	3.72	3.79	5.77	4.61	2.03	.01
Whole Figure	8.81	2.52	9.54	2.11	.73	.05
Technique	6.49	3.05	9.06	4.03	2.57	.01

TABLE 45

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
COMPARING GAINS OF ALL BOYS AND ALL GIRLS
ON COGNITIVE CLAY SCALE

Cognitive Clay Scale Person + Dog	BOYS	GIRLS	Diff. Between Groups	Sig. of Diff
	Mean Gain	Mean Gain		
Recogn.	2.64	2.13	.53	*
Physical Det.	3.19	3.37	- .18	*
Correctly Pl.	1.95	1.98	- .03	*
Proportions	2.58	2.12	.46	*
3-D	2.16	2.03	.13	*
Whole Figure	.50	0.73	- .13	*
Technique	1.99	2.57	- .58	*

* No Significant Gain

Table 46 presents the mean gains of the Experimental boys and girls with the Control boys and girls. The reader will note the similarity of the gains of the Experimental boys and the Experimental girls. The interesting differences in this table are between the Control boys and girls. The Control boys made significant gains in all subtests except Whole Figure, although not as much gain in expressing themselves in clay as the Experimental boys. The Control girls made no significant gains in clay.

It appears that clay is a natural medium for boys. Intervention helped them improve more than boys who had no intervention, but the Control boys also improved their skill with clay without intervention. The girls were good learners when they had intervention with clay, but without intervention they made almost no improvement in clay skills. We can say, therefore, that intervention helps both boys and girls develop cognitive clay ability, and that girls are not likely to improve significantly without intervention.

TABLE 46 MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING GAINS OF THE EXPERIMENTAL AND CONTROL GROUPS BY SEX ON THE COGNITIVE CLAY SCALE

Cognitive Clay Person + Dog	EXPERIMENTAL GROUP		CONTROL GROUP		Diff. Between Groups	Sig. of Diff.
	Mean Gain	Sig. of Gain	Mean Gain	Sig. of Gain		
	Boys (N = 125)		Boys (N = 37)			
Recogn.	3.01	.01	1.43	.05	1.58	.01
Physical Det.	3.36	.01	2.62	.05	.74	NS
Correctly Pl.	2.04	.05	1.65	.05	.39	NS
Proportions	2.78	.01	1.95	.01	.83	NS
3-D	2.20	.01	2.08	.05	.12	NS
Whole Figure	.71	NS	-0.19	NS	.90	.01
Technique	2.04	.01	1.83	.05	.21	NS
	Girls (N = 118)		Girls (N = 39)			
Recogn.	2.75	.01	.15	NS	2.60	.01
Physical Det.	4.32	.01	.38	NS	3.94	.01
Correctly Pl.	2.39	.01	.49	NS	1.90	.01
Proportions	2.70	.01	.28	NS	2.42	.01
3-D	2.38	.01	.95	NS	1.43	NS
Whole Figure	1.03	.05	- .15	NS	1.18	.05
Technique	3.04	.01	1.10	NS	1.94	.01

In the Sculptural Clay Scale we find phenomena similar to the results of the Cognitive Clay Scale (Table 47). The differences between boys and girls in the Experimental Group are negligible. The differences between the Experimental and Control girls again are greater than the differences between the Experimental and Control boys. Again we can say that intervention helped both boys and girls in their Sculptural Clay achievement. Girls make almost no improvement without intervention. The boys and girls in the Experimental Group made gains in similar subtests, the greatest difference being in Expression. Girls made more improvement in Expression than the boys. None of the differences between boys and girls reached a significant level.

TABLE 47 MEANS AND t-TESTS:
COMPARING GAINS OF EXPERIMENTAL AND CONTROL GROUPS BY SEX
ON THE SCULPTURAL CLAY SCALE ACCORDING TO JUDGES' EVALUATION OF CHANGE

Sculptural Clay Scale	EXPERIMENTAL	CONTROL	Diff. Between Groups
	Mean Gain	Mean Gain	
Person + Dog	BOYS		
Overall	1.63	.49	1.14
Surface	.26	.13	.13
Space	1.66	.52	1.14
Unity	1.72	.83	.89
Expression	1.66	1.48	.18
Utility	2.09	1.26	.83
Average	1.57	.91	.66
	GIRLS		
Overall	1.75	.33	1.42
Surface	.68	.68	.00
Space	1.53	.21	1.32
Unity	1.96	.75	1.21
Expression	2.13	.89	1.24
Utility	2.23	.68	1.55
Average	1.72	.75	.97

Drawing: Boys-Girls

Although we intervened in clay, we wanted to look at the influence of clay on drawing achievement of boys and girls. Tables 48 and 49 present the comparison of the boys and girls in the Experimental Group and in the Control Group.

TABLE 48 MEANS AND t-TESTS:
ACHIEVEMENT OF EXPERIMENTAL AND CONTROL GROUPS BY SEX
ON HARRIS-GOODENOUGH DRAWING TEST

Sex Group	Pretest Mean	Posttest Mean	Mean Gain	Sig. of Gain
	EXPERIMENTAL GROUP			
Boys	75.6	82.2	6.6	.01
Girls	79.7	85.4	5.7	.01
	CONTROL GROUP			
Boys	78.7	82.4	3.7	NS
Girls	81.7	82.4	0.7	NS

TABLE 49 MEAN GAINS AND DIFFERENCE
BETWEEN EXPERIMENTAL AND CONTROL GROUPS BY SEX
ON HARRIS-GOODENOUGH DRAWING TEST

Sex Group	EXPERIMENTAL Mean Gain	CONTROL Mean Gain	Diff. Between Groups
Boys	6.6	3.7	2.9
Girls	5.7	0.7	5.0

We find that boys and girls in the Experimental Group improved significantly in their drawing ability as measured by the Harris-Goodenough Drawing Test. However, we see again that the girls in the Experimental Group gained 5 points more than the girls in the Control Group. The difference between the Experimental boys and Control boys was only 3 points because of the gains of the Control boys.

Thus we can say that intervention in clay influenced drawing ability of both boys and girls. Without intervention the girls made little improvement. Boys made gains in the non-verbal media of both clay and drawing even without intervention, but teaching helped them make greater gains.

Verbal Cognition: Boys-Girls

We wanted to see the transfer from the development of clay abilities into other verbal cognitive areas for the boys and girls separately.

Table 50 presents the achievement of the Experimental and Control groups by sex in Clay Verbs, Duplicates, Embedded Figures, and the Harris-Goodenough Test. We see in this table that all groups made significant gains in Clay Verbs ($P < .01$), except the Control girls.

TABLE 50 MEANS AND t-TESTS:
ACHIEVEMENT OF EXPERIMENTAL AND CONTROL GROUPS BY SEX
ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest Mean	Posttest Mean	Mean Gain	Sig. of Gain
	EXPERIMENTAL BOYS (N = 123)			
Clay Verbs	9.45	11.42	1.97	.01
Duplicates	4.28	6.17	1.89	NS
Embedded Fig.	49.77	48.43	-1.34	NS
Harris-Good.	75.57	82.18	6.61	.01
	CONTROL BOYS (N = 37)			
Clay Verbs	8.87	10.95	2.08	.01
Duplicates	5.26	6.70	1.44	NS
Embedded Fig.	52.03	50.67	-1.36	NS
Harris-Good.	78.69	82.43	3.72	NS
	EXPERIMENTAL GIRLS (N = 124)			
Clay Verbs	9.40	11.56	2.16	.01
Duplicates	5.60	8.06	2.46	NS
Embedded Fig.	50.53	52.06	1.53	NS
Harris-Good.	79.71	85.35	5.64	.01
	CONTROL GIRLS (N = 40)			
Clay Verbs	9.28	10.20	.93	NS
Duplicates	4.73	5.92	1.19	NS
Embedded Fig.	49.03	47.44	-1.59	NS
Harris-Good.	81.65	82.35	.70	NS

No group made significant gains on Duplicates although the Experimental Group, both boys and girls, made larger gains than the Control Group.

No group made significant gains on the Embedded Figures test. The Experimental girls, however, did make a gain of 1.5 while all other groups had losses on this test.

The Experimental boys and girls both made significant gains on the Harris-Goodenough Drawing Test ($P < .01$). The Control girls made the least improvement on the drawing test.

Table 51 compares the Experimental and Control boys and the Experimental and Control girls. We can see that there is no real difference between the Experimental and Control boys on the verbal cognitive tests except in the drawing test. The difference was not significant. We see again that the Experimental girls made much more improvement in the Verbal Cognitive tests than the Control girls.

TABLE 51 COMPARING MEAN GAINS OF EXPERIMENTAL AND CONTROL GROUPS BY SEX ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	EXPERIMENTAL Mean Gain	CONTROL Mean Gain	Diff. Between Groups
	(N=123) BOYS	(N=37)	
Clay Verbs	1.97	2.08	- .11
Duplicates	1.89	1.44	.45
Embedded Fig.	-1.34	-1.36	.02
Harris-Good.	6.61	3.72	2.89
	(N=124) GIRLS	(N=40)	
Clay Verbs	2.16	.93	1.23
Duplicates	2.46	1.19	1.27
Embedded Fig.	1.53	-1.59	3.13
Harris-Good.	5.64	.70	4.94

Table 52 compares the boys and girls within each group. In this table we see that when girls had teaching in clay (Experimental Group), they gained as much or more than the boys in that group in most cognitive areas. When they did not have this instruction (Control Group), the boys made greater gains than the girls in all areas, and especially in Clay Verbs and the Harris-Goodenough Drawing Test which require psychomotor responses.

TABLE 52 COMPARING MEAN GAINS OF BOYS AND GIRLS WITHIN GROUPS ON VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	BOYS Mean Gain	GIRLS Mean Gain	Diff. Between Sexes
	EXPERIMENTAL GROUP (N=123)		
Clay Verbs	1.97	2.16	.19
Duplicates	1.89	2.46	.57
Embedded Fig.	-1.34	1.53	2.87
Harris-Good.	6.61	5.64	.97
	CONTROL GROUP (N=40)		
Clay Verbs	2.08	.93	1.15
Duplicates	1.44	1.19	.25
Embedded Fig.	-1.36	-1.59	.23
Harris-Good.	3.72	.70	3.02

TABLE 53

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF EXPERIMENTAL AND CONTROL GROUPS BY SEX ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI Subtests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean Gain	S.D.	Mean Gain	S.D.		
	EXPERIMENTAL BOYS (N = 83)					
Verbal I.Q.	90.18	13.40	98.04	14.39	7.87	.001
Information	7.81	2.63	9.30	3.10	1.49	.01
Vocabulary	7.48	2.70	8.78	2.76	1.30	.04
Arithmetic	9.27	2.67	9.56	2.50	.29	*
Similarities	9.44	3.17	10.64	3.29	1.19	.05
Comprehension	8.35	2.78	10.13	9.80	1.78	.01
Pic. Completion	9.90	3.38	11.16	2.85	1.25	.01
	EXPERIMENTAL GIRLS (N = 83)					
Verbal I.Q.	94.04	13.14	99.62	11.66	4.39	.01
Information	8.77	2.85	10.06	2.44	1.28	.01
Vocabulary	8.34	2.50	8.93	2.60	.59	*
Arithmetic	9.27	2.39	9.76	2.00	.49	*
Similarities	10.14	3.07	11.27	3.02	1.13	.05
Comprehension	7.50	2.45	9.87	2.69	.98	.05
Pic. Completion	10.27	2.75	11.12	2.51	.86	*
	CONTROL BOYS (N = 37)					
Verbal I.Q.	93.54	12.58	98.19	12.43	4.65	.05
Information	8.97	2.82	9.92	3.15	.95	*
Vocabulary	7.78	2.66	8.81	2.21	1.03	*
Arithmetic	9.92	2.83	9.92	2.18	.00	*
Similarities	10.03	2.83	10.84	2.87	.81	*
Comprehension	8.10	2.80	9.70	2.43	1.60	.01
Pic. Completion	12.22	3.42	12.49	3.59	.27	*
	CONTROL GIRLS (N = 40)					
Verbal I.Q.	92.56	15.31	93.43	13.92	.88	*
Information	8.58	2.72	8.85	2.80	.28	*
Vocabulary	8.10	2.17	8.13	2.29	.03	*
Arithmetic	9.35	3.27	9.25	2.78	- .10	*
Similarities	9.98	2.63	9.75	3.52	.23	*
Comprehension	8.33	2.78	8.95	2.85	.63	*
Pic. Completion	11.29	3.06	11.77	3.19	.48	*

* No Significant Gain

Table 53 presents the results of the WPPSI Verbal I.Q. test by sex and group. Table 54 compares the Experimental boys and girls. Table 55 compares the Experimental and Control boys and the Experimental and Control girls.

These tables reveal the same patterns on the WPPSI as appeared in the other cognitive tests, although this test is strictly verbal except for the Picture Completion Subtest. Experimental boys and girls both made significant gains in Verbal I.Q. The Control boys also gained in Verbal I.Q. and Comprehension, but the Control girls made almost no significant improvement in any part of the WPPSI Verbal I.Q. test.

Table 54 shows that the Experimental boys made more improvement than the Experimental girls on the subtests and the Verbal I.Q., although the differences were not significant. It is notable, however, that the boys made 3.5 points greater gain on the Verbal I.Q. than the girls. Table 53 shows that the boys' pretest was much lower than the girls', but after intervention the posttest means were nearly the same.

Table 55 confirms again that the Control boys improved in Verbal I.Q. enough that the differences between the Experimental and Control boys were not significant. On the other hand, girls in the Experimental Group made significant gains as compared with the Control girls. The girls who did not have the clay intervention made no measurable improvement in the Verbal I.Q. measure.

TABLE 54 MEANS, STANDARD DEVIATIONS, AND t-TESTS COMPARING GAINS OF BOYS AND GIRLS IN THE EXPERIMENTAL GROUP ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI SUBTESTS	Boys (N = 83)		Girls (N = 83)		Diff. Between Sexes	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
	EXPERIMENTAL GROUP					
Verbal I.Q.	7.87	9.07	4.39	14.62	3.48	.06
Information	1.49	2.06	1.28	2.35	.21	NS
Vocabulary	1.30	2.71	0.59	2.58	.71	NS
Arithmetic	0.29	2.51	0.49	2.27	- .20	NS
Similarities	1.19	3.21	1.13	3.27	.06	NS
Comprehension	1.78	2.74	0.98	2.73	.80	.06
Pic. Completion	1.25	3.04	0.86	3.28	.39	NS

TABLE 55

MEANS, STANDARD DEVIATIONS, AND t-TESTS: COMPARING EXPERIMENTAL AND CONTROL GROUPS BY SEX ON WPPSI VERBAL I.Q. AND SUBTESTS

WPPSI SUBTESTS	Experimental Group		Control Group		Diff. Between Groups	Sig. of Diff.
	Mean Gain	S.D.	Mean Gain	S.D.		
	BOYS (N = 83)		BOYS (N = 37)			
Verbal I.Q.	7.87	9.07	4.65	10.27	3.22	NS
Information	1.49	2.06	0.95	2.83	.54	NS
Vocabulary	1.30	2.71	1.03	3.11	.27	NS
Arithmetic	.29	2.51	0.00	2.31	.29	NS
Similarities	1.19	3.21	0.81	2.75	.38	NS
Comprehension	1.78	2.74	1.60	2.22	.18	NS
Pic. Completion	1.25	3.04	.27	3.35	.98	NS
	GIRLS (N = 83)		GIRLS (N = 40)			
Verbal I.Q.	4.39	14.62	0.88	9.92	3.51	.05
Information	1.28	2.35	0.28	2.46	1.00	.05
Vocabulary	.59	2.58	0.03	1.73	.56	NS
Arithmetic	.49	2.27	-0.10	3.36	.59	NS
Similarities	1.13	3.27	-0.23	3.50	1.36	.05
Comprehension	.98	2.73	0.63	2.45	.35	NS
Pic. Completion	.86	3.28	0.68	2.66	.18	NS

Summary: Boys-Girls

In this section we have been comparing the achievement of the boys and the girls in the combined Experimental group and in the Control Group in clay, drawing, and verbal cognitive abilities.

We found that both the boys and the girls who were taught through clay activities improved more than the boys and the girls in the Control Group:

1. In their clay achievement;

2. In their drawing achievement; and

3. In their verbal cognitive achievement, including I.Q.

Boys and girls who had clay intervention made similar gains in all media.

Boys with clay intervention achieved more than boys without clay intervention.

Boys made more gains even without intervention in all media than the girls who did not have the intervention. This was particularly true in the non-verbal media, but also carried over to the verbal.

Without clay intervention, the girls made almost no improvement in any medium.

Therefore we can say that clay is a good medium for teaching both boys and girls in disadvantaged Pre-kindergarten and Kindergarten. Clay appears to be a natural medium for boys to express themselves. They improved their achievement in the non-verbal media of clay and drawing and also improved in their verbal cognitive abilities without the teaching, but made greater gains with teaching. Girls in this population needed the teaching to help them improve their achievement.

The results of this study of using clay as a medium for teaching disadvantaged preschool children in Columbus are very similar to the results of the study in Israel.[9] Therefore we may say that we are not speaking about a medium that helped some children in one city in America develop their cognitive verbal I.Q. abilities, but we tapped a general solution. We do not say that clay should be used instead of reading books, or play, or music, or drawing, but it is definitely a very important medium, especially for boys (and for girls if we intervene) to develop not only their ability to express themselves in clay, but to transfer to other verbal cognitive areas, including I.Q.

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[9] Ibid., p. 21.

Summary: Question I

Did intervention through clay make a difference in the development of children's verbal cognitive achievement?

We compared the achievement of children in the Experimental Group (all intervention groups combined) with the achievement of the children in the Control Group over the same period of time. We asked if intervention in clay helps children improve in clay sculpturing, and if the improvement increases their achievement in other media, as compared with the Control Group.

Summary of Findings.

I Clay intervention improved their ability to express themselves in clay.

1. Intervention improved disadvantaged pre-kindergarten and kindergarten children's ability to express in clay details and relationships of whatever subjects sculptured significantly better than the Control Group.
2. The Experimental Group improved artistically, as well as cognitively, more than the Control Group. Teaching does not have a negative effect on aesthetic improvement.
3. Intervention improved the children's ability to express in clay the subjects that were used during their intervention period and prescribed to the children; they transferred and improved their ability on subjects that were not taught during the intervention and on subjects of their own choice.

II Development in clay expression influenced development in expression in other media.

1. Intervention in clay helped children improve and develop integrative aspects of drawing significantly more than no intervention.
2. The Experimental Group improved significantly more than the Control Group on most of the verbal cognitive skills that we measured. They made significant improvement on their WPPSI Verbal I.Q. and Subtests as well as on the Harris-Goodenough Drawing Test (I.Q.).

Now we can say that the clay being a non-verbal medium develops cognitive capabilities in the child and develops knowledge of his environment, giving him a feeling of knowing. Whatever he knows, he owns and he expresses it in other media, non-verbal as well as verbal. He also does better on an

I.Q. test. We know that I.Q. tests correlate highly with the ability to learn to read and reading achievement. Therefore, we have a medium, in clay, which is good to use with disadvantaged pre-kindergarten and kindergarten children because it helps develop those same areas that teachers try to develop through verbal media only.

III Children in both the Experimental Pre-kindergarten and Kindergarten gained from clay intervention more than their counterparts in the Control Group. Clay is a good medium for younger and older children.

IV Both boys and girls in the Experimental Group improved more than their counterparts in the Control Group. However, clay is a very special medium for boys. In the Control Group without any intervention, there was almost as much development in the boys. It seems to be a natural medium for them. The girls improved only with intervention, and they, like the boys, transferred to other media what they learned in the clay experiences.

Therefore, we can summarize this section of the findings which relates to our total Experimental Group (249 children) as compared with the Control Group (77 children): INTERVENTION WITH CLAY HELPS DEVELOP THE CHILDREN'S VERBAL AND COGNITIVE ABILITY. CLAY IS A GOOD MEDIUM FOR TEACHING.

When we compare the results with the results of the experiment in Israel, we can say with assurance that there is no reason why clay should not be an important medium for all disadvantaged young children across cultures along with all the verbal media that exist in the schools.

E. PROJECT OUTCOMES: RESEARCH QUESTIONS AND FINDINGS (Cont.)

Question II: Does the METHOD of teaching children with clay make a difference in the development of the children?

Introduction

In the first question we considered all children in the intervention groups together as the Experimental Group and compared them with the children in the Control Group to determine the effects of teaching with clay on children's achievement in various media. We found that there are significant differences between the achievement of children who had clay intervention and those who did not have it.

Since we found that teaching through clay helps children, we now looked for the BEST way to teach with clay. The question becomes: "Which of the methods we used was most effective in helping children develop skills in clay sculpturing; in helping children transfer their learning to drawing; in helping children develop their verbal cognitive skills?"

Analysis of Data.

In order to answer this question, the pretest and posttest means of the children in each experimental group were compared to determine the mean gains of the group. The significance of the gains was determined by applying a correlated t-test. An analysis of variance was computed to determine the effects of group, grade (age), and sex on the achievement in each dependent variable on all tests. A Pearson Product-Moment Coefficient Correlation matrix was produced to study transfer of learning from one medium to another.

Organization of this section in answer to Question II.

In this section, the term "teaching programs" will be used to discuss intervention groups. The three experimental teaching programs were:

1.	Encouragement:	Teacher supported each child in doing whatever he wanted to do with the clay.
2.	Discussion:	Teacher introduced subjects, provided experiences, and guided the child's observation and discussion of the subject and of the child's interpretation of that subject in clay.
3.	Technique:	Teacher did all of the above plus teaching the child techniques for using the medium of clay.

In most cases the Control Group is also considered for the purpose of comparison. Most of the findings reported here are based on the combined data of Person + Dog, as we considered two products to be more representative of the child's ability than only one. When appropriate, however, subjects will be considered separately. As in the previous section, "Cognitive Clay Scale" refers to the abbreviated scale described in Finding 1:1, Table 19.

Finding 2:1 in re: The influence of the different teaching programs on the improvement in cognitive clay achievement of disadvantaged preschool children.

Rationale: If we are to help teachers to know how to teach effectively with clay, we have to know how much help a child needs to improve his cognitive capabilities in clay sculpturing.

Given frequent exposure to clay and freedom to express his own ideas, will the child develop observational, thinking, verbal, and technical skills on his own? (Encouragement Teaching Program)

Or, does the child need guided observation and discussion in order to develop cognitive and verbal skills; given such guidance, will the experience with clay help the child to develop on his own the technical skills necessary to express his ideas (concepts) in clay? (Observation/Discussion Teaching Program)

Or, if the child is given technical instruction and guidance in using clay as a medium, will he be able to take better advantage of the guidance in the observational, thinking, and verbal skills? (Technique Teaching Program)

If we consider a task or systems analysis of what sculpturing-clay-objects requires of the child, we can see more clearly the potential areas in which a teacher might intervene in a child's clay activities to improve his development.

When a child is asked to make the form of an object (e.g. person, dog) out of clay, he is asked to perform a sequence of operations that begins with a concept of the object in his mind and ends with an object formed in clay whose form is fitted by the child to the concept of that object he has in mind.

Between the beginning and the end of this sequential event, action moves through a number of distinguishable orderings: to model an object out of clay, a child has---

to order the concept

to order the self

to order the hands

to order the clay

to order the shape

to order the sensory feedback

to order the percept in re the concept

For these orderings to take place, a series of systems is required, each system being a structure that functions within parameters, "characteristic of it."---

the system of conception

the system of self

the system of body action through the hands

the system of clay

the system of object-shape

the system of sensation

the system of perception, fitting percept to concept*

Assuming that every child has to proceed through all of these processes or systems in making an object from clay, at what points in this sequence of events is adult intervention most helpful in developing children's skills of clay sculpturing and in turn his other cognitive and verbal skills? The following diagram illustrates the systems, separable but interacting, as the child forms objects from the clay. The differently shaded spaces indicate the areas in which the various teaching programs intervened in the total process.

In the Encouragement Teaching Program, the teacher moved in with the child in the following areas:

Self:	She gave the child confidence in his own ability to represent whatever concept he chose, reinforcing his attempts, and encouraging him toward self-actualization.
Sensory Feedback:	As the child worked, the teacher encouraged him to talk about his clay product, and the teacher also provided "sensory feedback" by naming for the child what he was doing (e.g., "You are really pounding the clay." "You made that smooth, tall, thin, etc."). The child was encouraged to verbalize his sensory experiences himself.

In the Observation and Discussion Teaching Program, the teacher intervened in the following areas: (On the diagram note the overlapping areas, Fig. 1.)

Concept:	She introduced a subject and provided a variety of experiences with that subject to develop the concept.

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* Mooney, Ross L., "Working Notes on the System Implied in a Child-Modeling-Clay-Objects." Prepared in connection with ESEA Title III Project #508-1, Columbus, Ohio, Dec. 1974.

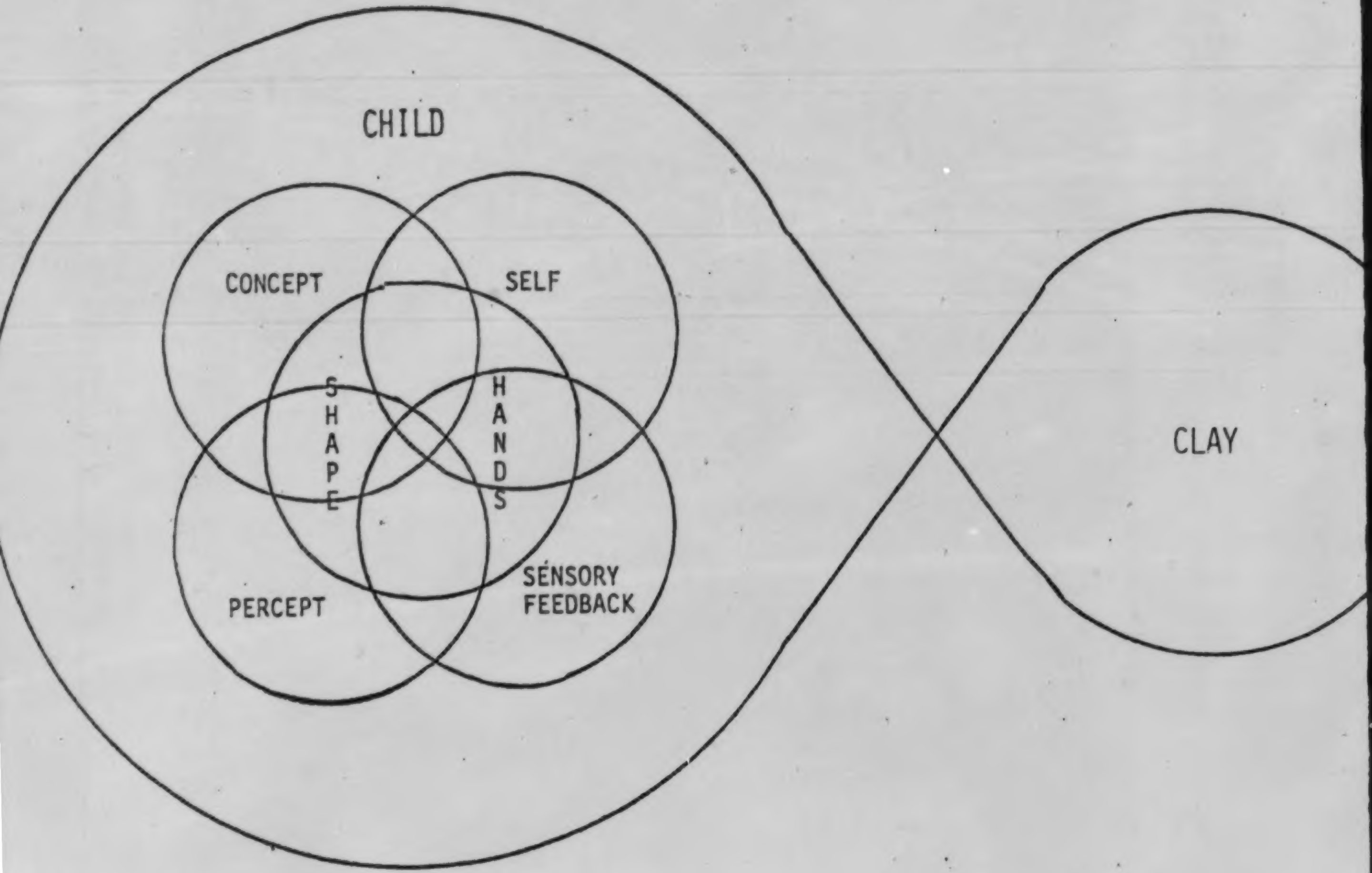
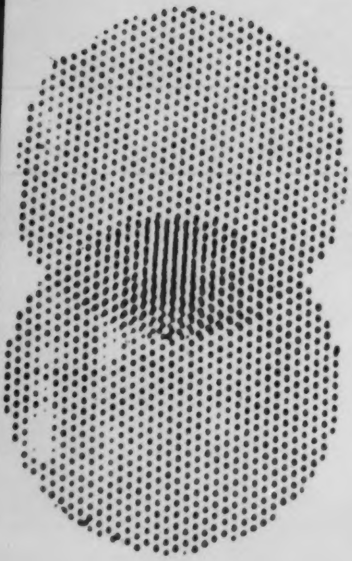
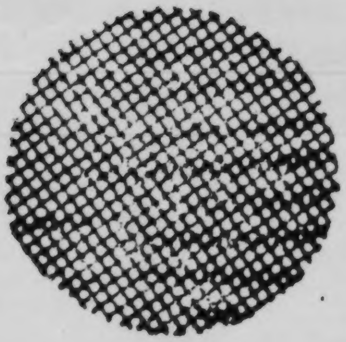

CHILD
CONCEPT
SELF
SHAPE
HANDS
PERCEPT
SENSORY FEEDBACK
CLAY

Fig. 1 MODEL OF THE CHILD-SCULPTURING-CLAY-OBJECTS



Encouragement Teaching Program

Observation/Discussion Teaching Program



Technique
Teaching
Program

Psychomotor

Cognitive [ ] Affective

Self: She then encouraged the child with an "I know you can do it," reinforcing the child in his efforts to represent the concept without intervening in the how-to-do-it.

Sensory Feedback: She discussed with the child his clay object, encouraging him to look again, compare, ask what is missing, and what else does he need.

Percept: She helped the child check his perception with the real, or asking "Can your doggy hear me if I call him?" "Tell me about your doggy: what does he have?"

In the Technique Teaching Program, the teacher intervened in every event in the sequence, as indicated by the center area of the diagram:

Concept: She introduced the subject and provided experiences.

Self: She reinforced the child in his efforts.

Hands: She demonstrated how to use the hands effectively (e.g., how to roll the clay into a ball and to use the thumb and fingers to shape the ball into a pinch pot).

Clay: She demonstrated how to use the characteristics of the clay to make it stick together, how to keep it moist and workable, etc.

Shape: She demonstrated and helped the child find alternatives in ordering the shape of the clay (e.g., from whole to parts and from parts to whole).

Sensory Feedback: As in the Observation/Discussion Teaching Program, she discussed with the child his work with the added emphasis on workableness of the clay and feedback related to the technique (e.g., how does the object stand?).

Percept: As in the Observation/Discussion Teaching Program, she discussed with the child his product, and if he was not able to make it to match his concept, she intervened with technical assistance.

We may note here the cumulative effect of the design of these teaching programs. The Encouragement program is basically an intervention in the affective domain. The Observation/Discussion program is basically an intervention in the affective and cognitive domains. The Technique program includes intervention in the affective, cognitive, and psychomotor domains. Thus, each program adds a support system for another domain or dimension of learning and knowing. We may ask how many and which of these support systems are necessary to the most effective teaching - learning through an art medium.

TABLE 56 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF CHILDREN IN EACH TEACHING PROGRAM ON THE COGNITIVE CLAY SCALE

Cognitive Clay Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
Person + Dog	Mean	S.D.	Mean	S.D.		
	ENCOURAGEMENT GROUP (N = 81)					
Recogn.	6.57	3.35	8.11	3.32	1.54	.05
Physical Det.	8.94	4.82	12.01	4.30	3.07	.001
Correctly Pl.	3.28	3.42	4.86	3.34	1.58	.01
Proportions	5.51	2.71	7.73	3.15	2.22	.001
3-D	3.44	3.08	4.04	3.79	.59	*
Whole Figure	9.40	2.63	9.24	2.29	- .16	*
Technique	7.30	2.92	8.35	3.13	1.09	.05
	DISCUSSION GROUP (N = 83)					
Recogn.	6.06	3.56	8.77	4.06	2.71	.001
Physical Det.	9.06	5.34	11.46	5.59	2.40	.052
Correctly Pl.	4.12	3.45	4.69	4.01	.57	*
Proportions	5.33	3.31	7.25	3.72	1.93	.001
3-D	3.67	3.17	6.96	4.69	3.27	.001
Whole Figure	9.36	2.43	10.22	2.42	.86	*
Technique	6.10	3.57	8.95	4.10	2.80	.001
	TECHNIQUE GROUP (N = 85)					
Recogn.	6.27	3.94	10.60	4.35	4.33	.001
Physical Det.	8.13	5.42	14.13	6.41	6.00	.001
Correctly Pl.	2.88	3.37	7.38	4.56	4.51	.001
Proportions	4.84	3.22	8.88	4.32	4.05	.001
3-D	4.38	4.21	7.35	3.89	2.94	.001
Whole Figure	8.98	2.90	10.81	2.07	1.84	.001
Technique	6.94	2.86	10.61	4.32	3.73	.001
	CONTROL GROUP (N = 77)					
Recogn.	6.30	3.75	7.07	3.85	.77	*
Physical Det.	8.75	5.10	10.20	5.04	1.46	*
Correctly Pl.	3.14	3.45	4.24	3.66	1.05	*
Proportions	5.20	3.10	6.24	3.57	1.04	.05
3-D	2.85	3.18	4.32	4.10	1.49	.05
Whole Figure	9.23	2.70	9.07	2.12	- .17	*
Technique	5.60	3.08	7.16	3.50	1.56	.05

* No Significant Gain

We will now look at the results of the intervention in the various teaching programs as measured by the Cognitive Clay Scale.

Results: Table 56 presents the achievement of the children in each teaching program on the Cognitive Clay Scale, and the significance of the gains. The Analysis of the Variance of the four groups revealed a main effect of group on every subtest of the Cognitive Clay Scale, significant at the .001 level of confidence.

In order to see the effects of the various teaching programs on each aspect of the development of the children's clay capabilities, the results of each subtest of the Cognitive Clay Scale are presented separately. For the comparisons on the whole scale, see Table 56.

Recognizability: This skill was scored on a 1-10 scale, based on photographs of children's work at various levels. Least recognizable was a "lump of clay." Most recognizable was a well-developed figure which would not be mistaken for anything other than what it was meant to be (i.e., person or dog).

TABLE 57 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN RECOGNIZABILITY: CLAY PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Technique	4.33	3.76	.001
Discussion	2.71	3.30	.001
Encouragement	1.54	3.33	.05
Control	.77	3.05	NS

The Technique Teaching Program produced the greatest gains in the children's capability to make recognizable figures.

The Observation and Discussion experiences also produced significant gains in Recognizability, but the child had to figure out his own way to make the clay express his visualization, so progress was slower. He did not have help with psychomotor skills.

The child who had regular experiences with clay in an encouraging atmosphere also made gains in Recognizability, but less than the other groups. He had to deal with the medium on his own and also had to discover his own subject and needs for observation. He was drawing only on his own experiences rather than being introduced systematically to concepts and experiences. Both cognitive and psychomotor skills had to be gained through exploration, trial-error, and depended on reinforcement from the teacher and his own sensory feedback.

Summary.

Over 16 weeks (32 sessions) of clay intervention, children made progress in Recognizability in direct relationship to the amount of help the teaching program included--the number of domains supported; number of systems in which teachers intervened.

Physical Details: The physical details of the clay figure were counted and recorded as the score. A checklist guided the testers to provide consistency in their observations. The range of scores was 0 to 22 on the pretest; 0 to 28 on the posttest; -15 to +21 gains.

TABLE 58 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN PHYSICAL DETAILS: CLAY PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Technique	6.00	6.37	.001
Encouragement	3.07	5.21	.001
Discussion	2.40	6.27	.052
Control	1.46	5.31	NS

The three Experimental teaching programs made significant gains on the number of physical details expressed in clay. The Control Group did not. This skill requires discrimination of parts and attention to detail. Again the Technique group made the greatest gains. Before intervention, the Technique group had a mean of 8 details and on the posttest the group mean was 14.1 details. The Discussion group began with 9.1 and the posttest mean was 11.5. The Encouragement group moved from 8.9 to 12.0 while the Control group moved from 8.8 to 10.2 (Table 56).

Increase in Physical Details would suggest an increased awareness, and attention to detail and discrimination. The Technique group was learning to observe but also learned more about how to represent detail than the children who had no technical training in their intervention. However, we see that the other two programs also produced significant development while the Control Group did not. We can say that just working with clay and representing what they knew best (Encouragement Group) did increase awareness and discrimination. The Discussion group began intervention with more detail than the other groups, and teachers and children may have put more emphasis on other aspects of the clay process during the intervention. The gains of the Discussion group were less significant.

We can conclude, however, that children's attention to detail at the preschool level can be accelerated through experience with clay on a regular basis, through discussion, through learning the techniques of "reporting in clay" their observations, and by combinations of the above.

Correctly Placed Details: Using a checklist, the clay objects were scored for the number of items placed correctly on the figure; i.e., head on top of body for person, or head on front of body for the dog figure, etc. This skill required observation of parts in spatial relationship to the whole.

TABLE 59 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN CORRECTLY PLACED DETAILS: CLAY PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Technique	4.51	3.79	.001
Encouragement	1.58	3.88	.01
Control	1.05	3.25	NS
Discussion	.57	3.74	NS

Children in the Technique program made the greatest gains on Correctly Placed Details. These children started with the lowest mean on the pretest but the posttest mean is 2.5 points higher than any other group mean. The Discussion group started highest on the pretest and made the least gain, but the posttest means of the Encouragement, Discussion, and Control groups were all nearly the same, a mean of 4 to 5 correctly placed details (Table 56).

Whole Figure: This subtest evaluated the child's ability to make a figure 3-dimensional and upright. Many children made flat and hollow figures which are more like drawing with clay than like sculpturing. We hoped to develop the children's ability to honor clay as a medium with its own possibilities which can represent their 3-dimensional world. This subtest criteria ranged from a figure lying down to a free standing figure.

TABLE 60 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN WHOLE FIGURE: CLAY PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Technique	1.84	3.35	.001
Discussion	0.86	3.28	NS
Encouragement	-0.16	3.18	NS
Control	-0.17	2.90	NS

Table 60 shows that the Technique group was the only group that made a significant gain in this subtest when we consider Person + Dog. The ability to make an upright figure requires knowing some techniques for making the clay work for the sculptor. The Discussion group made some gain.

The other groups actually showed losses. Often the pretest object was a lump of clay with little differentiation and was an "upright" figure. As children made more detailed, better proportioned figures, they had more difficulty making them stand. Without technical instruction on how to join parts and make the clay pieces stick together, one may become less successful instead of better in making the object stand as he improves in representing his concepts.

Another factor was that making a person upright on two legs is more of a feat than making a dog stand on four legs. Thus Table 60 which combines the two scores, in some cases, is misleading.

Table 61 shows that the subject of the sculpture has an important effect on the progress in the Whole Figure subtest. (Details in Tables 69-72.)

TABLE 61 MEAN GAINS OF THE TEACHING PROGRAM IN WHOLE FIGURE BY SUBJECT: CLAY PERSON, DOG, FREE

	Person		Dog		Free	
Teaching Program	Mean Gain	Sig.	Mean Gain	Sig.	Mean Gain	Sig.
Technique	.33	NS	1.51	.01	.83	.05
Discussion	.24	NS	0.62	.05	.47	NS
Encouragement	.09	NS	- .07	NS	.03	NS
Control	- .03	NS	.14	NS	- .05	NS

The rank order remains nearly the same with Technique group always making highest gains, but even that group did not have much success in making upright persons. When they made their free choice, they could choose objects more "clay-like" and made gains in free clay. The children in the Discussion group, who were taught "dog," made progress even through their own observation and problem-solving in making dogs stand. In the pretest, dogs and persons looked much alike. After observation and discussion experience, they gained in their understanding of body parts, their functions, and most children learned that dogs have four legs. The children without intervention and/or instruction made no progress in this subtest. (Control and Encouragement groups.)

Three-dimensional Details: In scoring 3-D concepts, the evaluator tried to determine if the part named was clearly interpreted by the child in a 3-D manner; that is, the part was not flattened out in a cookie manner or simply outlined in clay. Even if the figure was not standing, parts of the figure could be conceived by the child in 3-D ways; e.g., the head might be a round ball even if the rest of the figure was flattened out or outlined. The score was determined by counting the 3-D details of the figure and recording the number.

TABLE 62 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN 3-DIMENSIONAL DETAILS: CLAY PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Discussion	3.27	4.46	.001
Technique	2.94	4.86	.001
Control	1.49	3.88	.05
Encouragement	.59	4.15	NS

Table 62 shows that the Discussion and Technique groups made the most significant gains in 3-Dimensional Details. Table 56 sheds more light on this subtest by comparing the pre-post means.

After intervention, the mean number of 3-Dimensional Details in the posttest of each teaching program was:

Technique	7.4
Discussion	7.0
Control	4.3
Encouragement	4.0

This shows obvious effects of the cognitive stimulation in the two groups that had intervention versus the groups where teaching was incidental. Even though in the Discussion teaching program children were taught no clay techniques, increased observation appears to have increased the children's awareness of the multiple dimensions of their environment which they, in turn, represented in the clay.

When we look at the subjects separately, the Discussion teaching program is the only one in which the children made significant improvement in 3-D in person. Both Technique and Discussion improved in 3-D in dog--the subject taught. (Tables 71 and 72.)

Proportions: The proportions of the child's clay figure were rated on a 1-10 scale by the evaluator as she looked at the relationship of parts of the figure to the whole.

TABLE 63 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN PROPORTIONS: CLAY PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Technique	4.05	3.84	.001
Encouragement	2.22	3.19	.001
Discussion	1.93	3.29	.001
Control	1.09	2.86	.05

The children who had experience in the clay teaching programs all made significant improvement in proportions of their clay figures. All groups, including the Control, improved in proportions of a person. The Control Group did not improve in proportions of a dog. (Tables 69-72.) This skill evidently develops somewhat as a result of maturation. It is interesting that teaching through clay can accelerate that development.

Technique: This subtest was evaluated on a 1-10 scale to assess the child's ability to use clay as a medium. Did he make use of the characteristics of the clay as if he recognized it as a sculpturing medium versus a drawing or painting medium?

TABLE 64 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN CLAY TECHNIQUE: PERSON + DOG

Teaching Program	Mean Gain	S.D.	Sig. of Gain
Technique	3.73	3.92	.001
Discussion	2.80	3.76	.001
Control	1.56	3.20	.05
Encouragement	1.09	3.25	.05

The teaching programs which provided intervention in the most systems of sculpturing-clay-object helped children to make the most improvement in clay technique. The Control and Encouragement groups gained as a result of maturation and experience, but children in the Technique and Discussion teaching programs made additional improvement as a result of teaching.

Summary: Finding 2:1.

Table 65 summarizes the significance of the gains in each subtest of the Cognitive Clay Scale made by children in each teaching program. An analysis of the means (Table 56) is necessary to complete the description of the results, but Table 65 shows graphically the teaching programs which help children most in developing the Cognitive Clay Skills which we measured in this study.

TABLE 65 COMPARING THE SIGNIFICANCE OF THE GAINS RESULTING FROM EACH TEACHING PROGRAM ON THE COGNITIVE CLAY SCALE

Cognitive Clay Person + Dog	Significance of Gains				*Sig. of Effect of Groups
	ENCOURAGE. (N = 81)	DISCUSS. (N = 83)	TECHNQ. (N = 85)	CONTROL (N = 77)	
Recogn.	.05	.001	.001	NS	.001
Physical Det.	.001	.052	.001	NS	.001
Correctly Pl.	.01	NS	.001	NS	.001
Proportions	.001	.001	.001	.05	.001
3-D	NS	.001	.001	.05	.001
Whole Figure	NS	NS	.001	NS	.001
Technique	.05	.001	.001	.05	.001

* Analysis of variance considering group, grade, sex.

Tables 56 and 65 show that:

1. Children in the Control Group had lower mean scores on the posttest than any other group. They made no significant gains on subtests representing discrimination and representation of details. They made some improvement in making 3-D Details, Proportions, and general clay Technique.

2. Children in the Encouragement Program, who had regular sessions of clay activities with encouragement and support from their teachers, made significant improvement in all subtests except Whole Figure and 3-D Details. Except for these two subtests, their mean scores on the posttest were similar to those of the Discussion group.

3. Children in the Discussion Teaching Program, who had regular clay sessions with sequenced experiences of cognitive stimulation, observation, and discussion improved more than the Encouragement Group in their ability to use clay as a medium of expression; their gains were greater in Whole Figure, 3-Dimensional Details, Technique, and Recognizability. Although they did not have technical assistance, the consistent experiences of guided observation, questioning, and problem-solving with the medium helped them to improve in the use of the medium.

4. The Technique Group, who had assistance with dealing with the medium in addition to observation and discussion*, made significant improvement in all subtests ($P < .001$). They also had higher mean scores on the posttest for every subtest than any other group.

We can say that when children were provided with frequent and regular opportunities for clay activity in a supportive atmosphere, teachers intervening in the children's ordering of self and sensory feedback, they improved their cognitive capabilities in clay expression.

---

*As described in #3 above.

When teachers gave children cognitive stimulation through guided experiences in a supportive atmosphere, intervening in the ordering of concept, self, sensory feedback, and percept, children improved even more in their ability to express themselves with the clay. "Knowing" the subject more helped them express more.

When teachers gave children cognitive stimulation through guided experiences in a supportive atmosphere and helped them know how to make the clay respond to them, intervening in their ordering concepts, self, hand, clay, shapes, sensory feedback, and percepts, children improved most in their cognitive capability to express themselves in clay.

Finding in re: 2:2 The influence of the different teaching programs on the improvement of children's sculptural (artistic) clay achievement.

We have seen in the results concerning Question I that the combined experimental groups made significantly more improvement sculpturally (artistically) than the Control Group. It is especially important to look at the effect of each teaching program separately. Theorists and educators are cautious about intervening in an artistic medium for fear of stifling or destroying the child's expression and creativity. We looked to see if "more intervention," (e.g., "the Technique Teaching Program") would have a negative effect on the artistic achievement of the child even if it helped him to develop cognitive skills.

We looked to see if any teaching program had a negative effect on artistic sculptural ability and/or if any teaching program developed the artistic ability more than the other programs.

Table 66 presents the teaching programs in rank order of achievement on the Overal Sculptural Clay Scale. The Overall score was an evaluation by the art teachers of photographs of the pretest clay object and the posttest clay objects. The gains on Table 66 are the computed differences between pretest and posttest scores the judges' assigned. These gains reflect the gains in the combined person-and-dog scores for all the children (304) in each teaching program. The analysis of variance found a mean effect of group on all subtests significant at the .001 level of confidence. Technique group improved most, then Discussion group. The improvements in the Control and Experimental groups were similar.

TABLE 66 TEACHING PROGRAMS RANK ORDER BY ACHIEVEMENT ON THE OVERALL SCULPTURAL EVALUATION

Teaching Program	N	Mean Gain	Sig. of Gain
Technique	70	3.43	.001
Discussion	77	1.49	.01
Encouragement	80	.67	.05
Control	77	.51	NS

TABLE 67

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF CHILDREN IN EACH TEACHING PROGRAM ON THE SCULPTURAL CLAY SCALE

Sculptural Clay Person + Dog	N	Pretest Mean	Pretest S.D.	Posttest Mean	Posttest S.D.	Mean Gain	Sig. of Gain
		ENCOURAGEMENT					
Overall	80	5.03	1.58	5.70	1.31	.67	.051
Surface	56	4.44	1.25	4.70	1.12	.26	*
Space	56	5.44	1.52	5.61	1.65	.17	*
Unity	56	5.60	1.72	6.26	1.60	.66	.05
Expression	56	5.40	2.25	6.51	1.64	1.11	.01
Utility	56	5.21	1.85	6.04	1.70	.83	.01
Average	56	5.18	1.70	5.86	1.37	.68	.01
		DISCUSSION					
Overall	77	5.09	1.72	6.58	1.74	1.49	.01
Surface	53	4.45	1.16	4.57	.98	.12	*
Space	53	5.32	1.47	6.98	2.11	1.60	.01
Unity	53	5.38	1.62	7.22	1.92	1.89	.01
Expression	53	5.52	2.00	7.26	2.59	1.79	.01
Utility	53	5.54	1.63	7.32	1.98	1.78	.01
Average	53	5.25	1.42	6.85	1.63	1.60	.01
		TECHNIQUE					
Overall	70	5.03	1.89	8.46	2.48	3.43	.001
Surface	47	4.27	1.24	6.18	1.98	1.91	.01
Space	47	5.33	1.83	8.62	2.84	3.29	.001
Unity	47	5.27	1.80	7.41	2.72	2.17	.001
Expression	47	6.00	2.81	9.56	3.01	3.56	.001
Utility	47	5.22	1.98	9.09	2.89	3.87	.001
Average	47	5.18	1.93	8.60	2.40	3.42	.001
		CONTROL					
Overall	77	5.14	1.81	5.65	1.88	.51	*
Surface	51	4.47	1.15	4.79	1.33	.32	*
Space	51	5.18	1.79	5.42	2.00	.24	*
Unity	51	5.27	1.91	5.90	2.39	.63	*
Expression	51	5.55	2.23	6.50	2.65	.95	*
Utility	51	5.00	1.77	5.73	2.22	.73	*
Average	51	5.04	1.79	5.69	2.01	.65	*

* No Significant Gain

A more detailed sculptural analysis was made of the products of about 200 children using the Sculptural Clay Scale. Table 67 displays the details of this analysis. The interesting comparison in Table 67 is among the posttest means of the various groups on each subtest scale. The consistent rank order of teaching programs from highest to lowest posttest means on all subtests except Surface is (1) Technique, (2) Discussion, (3) Encouragement, and (4) Control.

Table 68 summarizes the achievement of children in each of the teaching programs on the Sculptural Clay Scale by presenting the significance of the gains by each group on all subtests.

TABLE 68 COMPARING THE SIGNIFICANCE OF THE GAINS RESULTING FROM EACH TEACHING PROGRAM ON THE SCULPTURAL CLAY SCALE: SAMPLE 200 CHILDREN

Sculptural Clay: Person + Dog	Significance of Gains in Each Group				*Sig. of Effect of Groups
	Encourg. (N=56)	Discuss. (N=53)	Technq. (N=47)	Control N=51)	
Surface	NS	NS	.001	NS	.001
Space	NS	.01	.001	NS	.001
Unity	.05	.01	.001	NS	.001
Expression	.01	.01	.001	NS	.001
Utility	.01	.01	.001	NS	.001
Average	.05	.01	.001	NS	.001

*Analysis of Variance

In Table 67 and Table 68 we can see that the children in the Control Group made no significant improvement in Sculptural clay achievement. Again it is obvious that the more intervention the children were given, the more improvement they made in sculptural achievement. Only with technical intervention did the children improve in the surface treatment of the clay figures.

The Encouragement Teaching Program results show that if children are given the opportunity to work with clay, they will improve their sculptural ability in Unity, Expression, and Utility.

The children in the Discussion Teaching Program made an average of .92 more gain on the subtests than the Encouragement Group. The greatest difference between these two groups was the greater improvement of the Discussion Group in organization of space: Discussion Group gain 1.60, the Encouragement Group gain 0.17.

The Technique Teaching Program resulted in 2 to 4 points mean gain on all subtests.

Summary: Finding 2:2.

Therefore we can say that any intervention and continued opportunity to use clay in a supportive atmosphere helped children develop their sculptural capabilities. Intervention which included experiences with subject matter, teaching of techniques of working with clay, and continued opportunity to use clay in a supportive atmosphere enhanced rather than retarded the children's artistic expression in clay.

Finding 2:3 in re: The influence of the different teaching programs on the improvement of subject taught during intervention (dog), subject not taught (person), and the subject of the child's free choice.

In answer to Question I, we found that the combined Experimental Group made significant gains in subjects taught and transferred learning to subjects not taught.

We needed to learn if the type of teaching program makes a difference in the child's transfer of learning from one subject to another. Tables 69 to 72 display the details of the pre- and posttests, gains, and significance of gain by each group in each subject. These tables show achievement of each teaching program separately in regard to children's transfer of learning from a subject taught to a subject not taught.

The Control Group and the Encouragement Group were not taught any particular subject. By comparing the dog and the person data for these two groups, we can see whether there were natural similarities in the children's capabilities in clay across subjects. When they improved in a skill in clay, was this capability generalized across subjects, even without teaching?

Tables 69 and 70 show that the posttest scores across subjects within each group are amazingly similar. The Control and Encouragement groups had somewhat higher means on some subtests for person than for dog.

We see that the Control Group made no significant gains in any cognitive clay subtest when they made dog, except a slight improvement in Technique. The gain in Technique for dog was .71 and very similar to the gain in Technique for person .77. Both were significant at the .05 level of confidence. The only other significant gain of the Control Group was Physical Details in Free clay .99 ($P < .05$).

The Encouragement Group improved in their making the clay dog in Physical Details ($P < .05$), Correctly Placed Details ($P < .05$), and Proportions ($P < .01$). In person, they improved in the same subtests, plus in Recognizability ($P < .01$), which is probably a result of the improvement in the other subtests.

Thus we can see that the capabilities the children developed naturally and through experiences were generalized across subjects, and that improvement in a skill does transfer across subjects.

What happens if through adult intervention the child develops a capability while representing a given subject? Will he generalize that skill to making another subject? Both the Discussion and Technique groups were taught about dogs during the intervention. The Discussion Group had experiences with dogs, but were given no technical instruction. The Technique Group not only experienced dogs, but were shown various techniques for making dogs and other four-legged animals. Table 71 and Table 72 present the achievement of the Discussion and Technique groups by subject.

TABLE 69 COGNITIVE CLAY: ACHIEVEMENT OF THE CONTROL GROUP IN EACH SUBJECT - PERSON, DOG, FREE

CONTROL GROUP (N = 77)						
Cognitive Clay	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	PERSON					
Recogn.	3.23	2.08	3.64	2.13	.40	*
Physical Det.	4.47	2.98	5.44	3.24	.97	*
Correctly Pl.	1.52	1.93	2.17	2.11	.63	*
Proportions	2.43	1.57	2.13	1.47	.65	*
3-D	1.29	1.71	2.10	2.37	.82	*
Whole Figure	4.64	1.64	4.33	1.36	- .31	*
Technique	2.77	1.68	3.53	2.06	.77	.05
	DOG					
Recogn.	3.07	1.89	3.43	2.07	.36	*
Physical Det.	4.27	2.62	4.76	2.53	.48	*
Correctly Pl.	1.62	1.86	2.05	2.11	.43	*
Proportions	2.77	1.81	3.23	2.02	.47	*
3-D	1.55	1.74	2.22	2.36	.66	*
Whole Figure	4.60	4.36	4.74	1.50	.14	*
Technique	2.91	1.60	3.62	1.75	.71	.05
	FREE					
Recogn.	3.44	2.59	3.62	2.42	.18	*
Physical Det.	2.13	2.34	3.12	2.73	.99	.05
Correctly Pl.						
Proportions						
3-D	1.18	1.47	1.74	1.82	.56	*
Whole Figure	4.84	2.00	4.79	1.67	- .05	*
Technique	2.92	1.80	3.45	2.05	.60	*

* No Significant Gain

TABLE 70 COGNITIVE CLAY: ACHIEVEMENT OF THE ENCOURAGEMENT GROUP IN EACH SUBJECT - PERSON, DOG, FREE

ENCOURAGEMENT GROUP (N = 81)						
Cognitive Clay	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	PERSON					
Recogn.	3.17	1.95	4.10	1.99	.93	.01
Physical Det.	4.56	3.14	6.57	3.71	2.01	.01
Correctly Pl.	1.49	2.04	2.33	2.11	.84	.05
Proportions	2.68	1.60	3.83	1.69	1.15	.01
3-D	1.72	1.78	2.15	2.16	.43	*
Whole Figure	4.68	1.56	4.59	1.26	.09	*
Technique	3.67	1.88	4.25	1.73	.61	*
	DOG					
Recogn.	3.40	4.37	4.01	1.82	.62	*
Physical Det.	4.32	2.16	5.44	2.31	1.66	.05
Correctly Pl.	1.79	2.03	2.53	1.99	.74	.05
Proportions	2.83	1.57	3.90	1.97	1.07	.01
3-D	1.73	1.71	1.89	2.09	.16	*
Whole Figure	4.72	1.58	4.64	1.38	-.07	*
Technique	3.62	1.49	4.05	1.93	.42	*
	FREE					
Recogn.	3.53	2.35	4.07	2.38	.54	*
Physical Det.	2.48	2.38	3.65	2.71	1.17	.05
Correctly Pl.						
Proportions						
3-D	1.22	1.65	1.89	2.12	.67	*
Whole Figure	4.84	1.61	4.86	1.41	.03	*
Technique	3.90	1.72	4.08	2.14	.15	*

* No Significant Gain

TABLE 71 COGNITIVE CLAY: ACHIEVEMENT OF THE DISCUSSION GROUP IN EACH SUBJECT - PERSON, DOG, FREE

DISCUSSION GROUP (N = 83)						
Cognitive Clay	Pretest		Posttest		Mean Gain	Sig.of Gain
	Mean	S.D.	Mean	S.D.		
	PERSON					
Recogn.	3.02	2.10	4.25	2.21	1.23	.01
Physical Det.	4.49	3.31	3.14	3.84	1.31	.05
Correctly Pl.	1.78	1.93	2.06	2.17	.28	*
Proportions	2.57	1.80	3.29	1.76	.72	.05
3-D	1.57	1.76	3.33	2.98	1.76	.01
Whole Figure	4.57	1.40	4.81	1.49	.24	*
Technique	3.13	2.12	4.24	2.26	1.11	.01
	DOG					
Recogn.	3.04	1.91	4.52	2.29	1.48	.01
Physical Det.	4.57	2.54	5.65	3.03	1.08	.05
Correctly Pl.	2.34	2.04	2.63	2.33	.29	*
Proportions	2.76	1.88	3.96	2.36	1.21	.01
3-D	2.07	3.03	3.64	2.25	1.57	.01
Whole Figure	4.79	1.53	5.41	1.63	.62	.05
Technique	3.96	1.84	4.65	2.20	1.68	.01
	FREE					
Recogn.	2.89	2.04	4.28	2.47	1.39	.01
Physical Det.	2.32	2.04	3.53	2.60	1.21	.05
Correctly Pl.						
Proportions						
3-D	1.45	1.66	2.51	2.29	1.06	.05
Whole Figure	4.87	1.73	5.34	1.66	.47	*
Technique	2.94	2.04	4.12	2.18	1.18	.01

* No Significant Gain

TABLE 72 COGNITIVE CLAY: ACHIEVEMENT OF THE TECHNIQUE GROUP IN EACH SUBJECT - PERSON, DOG, FREE

TECHNIQUE GROUP (N = 85)						
Cognitive Clay	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	PERSON					
Recogn.	3.47	2.46	4.93	2.55	1.46	.01
Physical Det.	4.37	3.22	7.13	3.77	2.77	.01
Correctly Pl.	1.51	1.81	3.34	2.64	1.84	.01
Proportions	2.44	1.68	3.83	2.22	1.40	.01
3-D	2.47	2.73	3.28	2.36	.81	*
Whole Figure	4.48	1.72	4.81	1.34	.33	*
Technique	3.50	1.62	4.89	2.37	1.35	.01
	DOG					
Recogn.	2.80	2.01	5.67	2.28	2.87	.01
Physical Det.	3.77	2.92	7.00	3.27	3.24	.01
Correctly Pl.	1.30	2.01	4.05	2.42	2.67	.01
Proportions	2.40	1.88	5.05	2.39	2.65	.01
3-D	1.94	2.06	4.07	2.13	2.10	.01
Whole Figure	4.49	1.78	6.00	1.26	1.51	.01
Technique	3.42	1.63	5.76	2.16	2.34	.01
	FREE					
Recogn.	4.11	2.79	5.68	2.33	1.58	.01
Physical Det.	3.00	2.81	4.68	2.91	1.68	.01
Correctly Pl.						
Proportions						
3-D	2.04	2.58	3.01	2.31	1.00	.05
Whole Figure	5.12	1.94	5.97	1.38	.83	.05
Technique	3.72	1.82	5.31	2.21	1.56	.01

* No Significant Gain

TABLE 73 ACHIEVEMENT OF THE DISCUSSION AND TECHNIQUE GROUPS ON THE COGNITIVE CLAY SCALE FOR DOG AS COMPARED WITH PERSON

Cognitive Clay	Dog	Person	Difference	
	Mean Gain	Mean Gain	Dog Higher Gain	Person Higher Gain
	DISCUSSION TEACHING PROGRAM			
Recogn.	1.48	1.23	.25	
Physical Det.	1.08	1.31		1.23
Correctly Pl.	0.27	.28	.01	
Proportions	1.21	.72	.29	
3-D	1.57	1.74		.17
Whole Figure	0.61	.24	.37	
Technique	1.68	1.11	.57	
	TECHNIQUE TEACHING PROGRAM			
Recogn.	2.87	1.46	1.41	
Physical Det.	3.24	2.77	.47	
Correctly Pl.	2.67	1.04	.83	
Proportions	2.65	1.40	1.25	
3-D	2.10	.81	1.29	
Whole Figure	1.51	.33	1.18	
Technique	2.34	1.36	.98	

Table 73 shows that the children in Discussion Teaching Program made similar improvement in making dogs and in making persons, although the teaching experience was concerning dogs and other animals.

The Technique Group made greater gains in the subject taught than the Discussion Group, but their gains in the person (subject not taught) were not much greater than those of the Discussion Group, except in number of Physical Details and Correctly Placed Details.

Summary: Finding 2:3.

Regarding transfer of learning from a subject-taught to a subject-not-taught, we can say that children developed capabilities in sculpturing-clay-objects which they generalized across subjects. Children who were not given teaching and assistance in technique reached similar levels on both subjects in most subskills of sculpturing. Children in the Technique Teaching Program improved greatly on the subject-taught, but made improvement on the subject-not-taught similar to the children in the Discussion Teaching Program.

Table 74 presents the correlations of dog gains with person gains for each subtest of the Cognitive Clay Scale for each teaching program. These correlations are further evidence that children who improve their skills in one clay subject utilize those improved skills across subjects.

TABLE 74

CORRELATIONS: COMPARING THE COGNITIVE CLAY GAINS
IN DOG AND IN PERSON IN EACH TEACHING PROGRAM

Teaching Program / Cognitive Clay Subtests	ENCOURAGE. (N=81)		DISCUSS. (N=83)		TECHNQ. (N=85)		CONTROL (N=77)	
	r	P	r	P	r	P	r	P
Recogn.	.22	.023	.19	.042	.30	.002	.34	.001
Physical Det.	.41	.001	.55	.001	.46	.001	.31	.001
Correctly Pl.	.22	.024	.29	.004	.28	.004	.28	.006
Proportions	.29	.004	.36	.001	.53	.001	.38	.001
3-D	.48	.001	.32	.002	.41	.001	.32	.002
Whole Figure	.36	.001	.30	.003	.39	.001	.14	.105
Technique	.25	.001	.40	.001	.53	.001	.58	.001

Finding 2:4 in re: The influence of the different teaching programs on the improvement in children's drawing achievement.

In Question I, we found that the Experimental Group made more improvement in the Harris-Goodenough Drawing Test (Performance I.Q.) than the Control Group.

We now wanted to see which clay teaching program had the most influence on improvement in drawing. Table 75 shows that children in the experimental teaching programs made mean gains of 5 to 7 points on the Drawing Test, while the Control Group gained an average of only 2 points.

On the Drawing Observation Scale (Table 76), all groups including the Control Group made significant gains, but the children in the Technique Teaching Program had the highest mean posttest scores and the largest gains. The greatest differences between the gains in drawing made by the Technique Group and the Control Group were in Physical Details (Technique Group, 1.42 greater gain) and in Proportions (Technique Group, 1.15 greater gain). The differences in drawing achievement as measured by this scale are more related to age and sex within groups as we shall see later.

In summary, we can say that on the Harris-Goodenough Drawing Test all teaching programs produced similar gains in drawing, all of which were greater than the Control Group, although the Control Group did make progress in drawing. We assume that the Control children received more practice in drawing than in clay sculpturing during the 16 weeks between pretest and posttest.

TABLE 75 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF CHILDREN IN EACH TEACHING PROGRAM ON THE HARRIS-GOODENOUGH DRAWING TEST

Teaching Program	Pretest		Posttest		Mean Gain	Sig. of Mean
	Mean	S.D.	Mean	S.D.		
Encouragement	76.79	12.14	83.31	11.99	6.26	.01
Discussion	78.20	14.10	83.32	10.71	5.03	.01
Technique	78.05	13.46	84.74	12.59	6.82	.01
Control	80.25	12.02	82.39	11.32	2.13	NS

TABLE 76

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF CHILDREN IN EACH TEACHING PROGRAM
IN DRAWING AS MEASURED BY THE DRAWING OBSERVATION SCALE

Drawing Observation Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	ENCOURAGEMENT (N = 81)					
Recogn.	7.81	3.40	9.03	3.14	1.82	.001
Physical Det.	13.27	6.24	17.13	5.09	3.91	.001
Correctly Pl.	4.83	4.18	7.02	4.28	2.20	.001
Proportions	5.60	2.59	7.87	3.10	2.27	.001
Perspective	7.75	.92	8.28	2.10	0.53	*
Technique	6.23	2.35	8.16	2.77	1.89	*
	DISCUSSION (N = 83)					
Recogn.	8.01	3.57	10.05	3.70	2.04	.001
Physical Det.	14.35	7.22	17.16	5.39	2.81	.01
Correctly Pl.	6.83	4.36	7.89	4.34	1.16	*
Proportions	6.10	3.30	7.76	3.02	1.61	.001
Perspective	7.65	1.13	8.12	.80	.47	*
Technique	5.98	3.02	7.93	3.03	1.95	.001
	TECHNIQUE (N = 85)					
Recogn.	8.33	4.02	10.56	3.65	2.24	.001
Physical Det.	13.53	7.05	18.59	6.12	5.06	.001
Correctly Pl.	5.51	4.73	8.61	5.17	3.10	.001
Proportions	5.74	2.79	8.46	3.74	2.72	.001
Perspective	7.51	1.14	8.42	1.52	.90	.05
Technique	7.08	2.71	9.17	3.83	2.09	.001
	CONTROL (N = 77)					
Recogn.	8.05	3.53	9.95	3.30	1.90	.001
Physical Det.	13.88	5.33	17.52	5.14	3.64	.001
Correctly Pl.	5.88	4.55	8.26	4.73	2.68	.001
Proportions	6.00	3.39	7.57	3.08	1.57	.001
Perspective	7.91	.40	8.29	1.19	.38	*
Technique	6.08	2.81	8.13	3.35	1.95	.001

* No Significant Gain

Finding in re: The influence of the different teaching programs on
2:5 the children's improvement in the verbal cognitive tests.

In Question I we found that the Experimental Group improved more than the Control Group in some areas and not in others and that age and sex made more difference in some tests.

We wanted to know which teaching programs had most influence on transfer from clay to verbal cognitive abilities. Table 77 presents the achievement of all groups on Verbal Cognitive Tests.

The analysis of variance found a main effect of group in Clay Verbs (P .001) and WPPSI I.Q. (P .001).

In descending order, the mean gains of the teaching programs on Clay Verbs were:

Technique	3.54	$P < .01$
Control	1.48	$P < .01$
Encouragement	1.37	$P < .01$
Discussion	.73	NS

Looking at gains does not take into account the variance between groups on the pretest. To look at actual achievement, a comparison of the posttest means gives somewhat different ordering of the groups:

Technique	12.26
Encouragement	11.00
Discussion	10.72
Control	10.56

Either way of looking at the results shows that the Technique Group made the greatest achievement in Clay Verbs. The very nature of the intervention, i.e., its emphasis on the "doing," demonstrations, etc., lends itself to learning clay vocabulary and doing what the Clay Verb test measures. (See test in Appendix.)

The Encouragement Teaching Program focused on encouraging the child and describing whatever he was doing. This type of reinforcement and verbalizing of the child's action may account for the improvement in Clay Verbs in this group. The Discussion Teaching Program focused mainly on concepts of the subject being made and deliberately avoided giving assistance with technical problems of working with clay. It is highly probable that there was less talk about what the child was doing with the clay than about the number of legs that a dog has, for example.

The Control Group made significant gains but they started lower than either the Encouragement or Discussion group and had the lowest mean posttest score of the four groups.

TABLE 77

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF CHILDREN IN EACH TEACHING PROGRAM IN VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	ENCOURAGEMENT (N = 81)					
Clay Verbs	9.63	3.03	11.00	2.36	1.37	.01
Duplicates	4.94	3.20	6.61	3.54	1.67	.05
Embedded Figure	49.58	11.03	50.18	9.96	.39	*
Harris-Goodenough	76.79	12.14	83.31	11.99	6.26	.01
WPPSI Verbal I.Q.	93.20	13.12	98.07	12.49	4.88	.01
Information	8.26	2.72	9.31	2.88	1.05	.01
Vocabulary	8.16	2.62	8.57	2.26	.41	*
Arithmetic	9.44	2.41	9.77	2.07	.32	*
Similarities	10.14	3.20	11.07	3.05	.94	*
Comprehension	8.80	2.92	9.84	3.08	1.04	.05
Picture Completion	9.57	3.23	10.72	2.83	1.15	.05
	DISCUSSION (N = 83)					
Clay Verbs	9.96	2.88	10.72	2.58	.73	*
Duplicates	5.10	2.79	7.08	3.89	1.98	.05
Embedded Figure	51.78	9.48	50.81	9.34	- .92	*
Harris-Goodenough	78.20	14.10	83.32	10.71	5.03	.01
WPPSI Verbal I.Q.			95.37	10.97		
Information			9.29	2.52		
Vocabulary			8.23	1.93		
Arithmetic			9.18	2.30		
Similarities			10.53	2.72		
Comprehension			9.23	2.68		
Picture Completion			12.01	2.50		
	TECHNIQUE (N = 85)					
Clay Verbs	8.76	3.51	12.26	3.10	3.54	.01
Duplicates	4.80	4.15	7.69	4.32	2.88	.01
Embedded Figure	49.04	10.71	49.80	11.30	.76	*
Harris-Goodenough	78.05	13.45	84.74	12.59	6.82	.01
WPPSI Verbal I.Q.	91.07	13.60	99.56	13.68	8.49	.01
Information	8.32	2.80	10.04	2.70	1.72	.01
Vocabulary	7.67	2.63	9.12	3.00	1.46	.01
Arithmetic	9.11	2.63	9.57	2.41	.46	*
Similarities	9.47	2.98	10.85	3.29	1.38	.01
Comprehension	8.44	2.71	10.15	2.88	1.72	.01
Picture Completion	10.58	2.86	11.54	2.54	.97	.05
	CONTROL (N = 77)					
Clay Verbs	9.08	2.53	10.56	2.97	1.48	.01
Duplicates	4.98	3.15	6.29	3.63	1.31	*
Embedded Figure	50.47	10.31	48.99	9.25	-1.48	*
Harris-Goodenough	80.25	12.02	82.39	11.32	2.13	*
WPPSI Verbal I.Q.	93.03	14.02	95.71	13.35	2.69	*
Information	8.77	2.75	9.36	3.00	.60	*
Vocabulary	7.95	2.41	8.46	2.26	.51	*
Arithmetic	9.62	3.06	9.57	2.52	- .05	*
Similarities	10.00	3.25	10.27	3.25	.27	*
Comprehension	8.22	2.77	9.31	2.66	1.09	.01
Picture Completion	11.29	3.06	11.76	3.19	.48	*

* No Significant Gain

Obviously some of the vocabulary in the Clay Verbs test develops in the process of maturation, test-learning, and schooling. However, children who had intervention in the most systems (Technique Group) made the highest gains.

In the Duplicates test, the children in each teaching program made significant gains. The Control Group made no significant gain. In descending order of achievement in Duplicates, the teaching programs were in the following sequence:

TABLE 78 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT IN DUPLICATES: PERSON + DOG

Teaching Program	Posttest Mean	Mean Gain	Sig. of Gain
Technique	7.69	2.88	.01
Discussion	7.08	1.98	.05
Encouragement	6.61	1.67	.05
Control	6.29	1.31	NS

This test was scored by counting the number of items the child made in his clay product that were the same as he named in his verbal enumeration of the same subject. We assume that the more duplicates a child had in his clay and verbal enumeration, the stronger and more complete his concept of the subject. The above chart indicates that the more systems of the child in which we intervened, the better his concept development, and thus, the more complete and consistent the child's representation of that concept across media.

In the Embedded Figure Test, the children made no significant gains in any group, and the Control Group lost 1.5 points.

Children in all teaching programs made significant gains on the Harris-Goodenough Drawing Test, performance I.Q., ($P < .01$). The Control Group did not make significant gains (Table 77).

In considering the WPPSI, we analyzed the gains of only two teaching programs because of the pretest problem in the Discussion Group. Discussion Group posttest means were included in Table 77 for comparison with the other groups. The Technique Group began the lowest and progressed farther than any other group with an 8.5 gain in Verbal I.Q.

The Encouragement Group's pretest had the same mean as the Control Group, but the Encouragement Group made 4.9 points of gain in Verbal I.Q. compared with 2.7 points gain made by the Control Group.

Observations in the classrooms also led us to believe the children in the Discussion Group made verbal cognitive growth as a result of the intervention. The means and gains on the WPPSI follow very closely the trends in the Harris-Goodenough test. We would expect, seeing this pattern, that the Discussion Group also made substantial gains, but unfortunately, we cannot confirm this with our data.

Again we see that the more intervention which was given with clay, the greater the progress in the children's verbal development. However, even regular experience in a supportive atmosphere, with no specific teaching, resulted in more cognitive growth than with no clay intervention at all.

In the WPPSI Subtests, only the Technique Group had significant gains in Vocabulary and Similarities (Table 77).

Summary: Finding 2.5.

The main purpose of this study was to find a way to use a non-verbal medium (clay) to develop verbal cognitive skills of disadvantaged pre-school children.

In this section we have seen that the children who had regular experiences with clay made statistically significant improvement in standardized drawing and verbal I.Q. tests. The children who received adult intervention in more of the systems involved in the child-sculpturing-clay-objects made the most significant improvement in the largest number of verbal cognitive measures.

Finding 2:6 in re: The influence of the different teaching programs on the improvement in clay, drawing, and verbal cognitive tests of the pre-kindergarten children as compared with the kindergarten children in each teaching program.

The question asked here was: "If one were to choose a clay teaching program for four- or five-year-old children, is one intervention method more effective than another for either age group?

Clay: Pre-kindergarten and Kindergarten

Table 79 shows the comparative achievement on the Cognitive Clay Scale of the pre-kindergarten and kindergarten children in all teaching programs.

Table 79 shows that pre-kindergarten children require more intervention than kindergarten children in order to improve their skills in clay sculpturing. In both grades, the descending rank order of achievement of the teaching programs was:

TABLE 79

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF CHILDREN IN EACH TEACHING PROGRAM ON THE COGNITIVE CLAY SCALE: PERSON PLUS DOG

Cognitive Clay: Person and Dog	Pre-kindergarten (N = 39)						ENCOURAGEMENT GROUP (N = 81) Kindergarten (N = 42)					
	Pretest		Posttest		Mean Gain	Sig. of Gain	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.			Mean	S.D.	Mean	S.D.		
Recognizability	5.44	2.80	6.56	2.94	1.13	*	7.62	3.50	9.55	3.02	1.93	.01
Physical Details	7.00	3.93	10.72	4.12	3.72	.01	10.74	4.91	13.21	4.16	2.48	.05
Correctly Placed	2.31	2.88	3.90	2.86	1.59	*	4.19	3.66	5.76	3.53	1.57	.05
Proportions	4.54	2.21	6.23	2.56	1.69	.05	6.41	2.85	9.12	3.04	2.71	.001
3-Dimensional	2.82	2.19	4.13	3.01	1.31	*	4.02	3.65	3.95	4.43	-0.07	*
Whole Figure	9.03	2.67	9.56	2.54	0.54	*	9.74	2.57	8.93	2.01	-0.81	*
Technique	6.56	2.77	7.21	3.12	.87	*	8.07	2.88	9.42	2.77	1.29	*
	Pre-kindergarten (N = 44)						DISCUSSION GROUP (N = 83) Kindergarten (N = 39)					
Recognizability	4.60	3.19	7.27	3.80	2.68	.001	7.72	3.24	10.40	3.71	2.74	.001
Physical Details	7.23	5.48	9.48	5.50	2.25	*	11.13	4.99	13.69	4.85	2.56	.055
Correctly Placed	3.11	3.31	3.77	3.82	0.66	*	5.26	3.27	5.72	4.01	.46	*
Proportions	4.18	2.86	6.05	3.37	1.86	.05	6.62	3.35	8.62	3.66	2.00	.01
3-Dimensional	2.68	2.88	5.20	3.73	2.52	.05	4.82	3.13	8.95	4.90	4.13	.001
Whole Figure	9.39	2.62	9.91	2.48	0.52	*	9.33	2.24	10.56	2.34	1.23	*
Technique	4.52	2.10	6.91	3.61	2.36	.01	7.87	4.04	11.21	3.38	3.29	.001
	Pre-kindergarten (N = 40)						TECHNIQUE GROUP (N = 85) Kindergarten (N = 45)					
Recognizability	4.68	3.16	8.45	3.66	3.78	.001	7.69	4.05	12.51	4.03	4.82	.001
Physical Details	6.02	5.16	10.55	5.62	4.53	.001	10.00	4.99	17.31	5.33	7.31	.001
Correctly Placed	1.52	2.15	4.50	3.19	2.98	.001	4.09	3.81	9.96	4.05	5.87	.001
Proportions	3.78	2.32	6.58	3.24	2.80	.001	5.78	3.62	10.93	4.19	5.16	.001
3-Dimensional	3.35	3.85	5.82	3.29	2.48	.05	5.32	4.34	8.71	3.92	3.39	.001
Whole Figure	8.55	3.09	10.53	2.33	1.98	.01	9.36	2.70	11.07	1.80	1.71	.05
Technique	6.30	2.97	8.40	3.33	2.18	.01	7.52	2.65	12.56	4.18	5.12	.001
	Pre-kindergarten (N = 39)						CONTROL GROUP (N = 77) Kindergarten (N = 38)					
Recognizability	4.18	2.69	5.18	3.32	1.00	*	8.47	3.43	9.00	3.39	0.53	*
Physical Details	6.28	4.37	7.54	3.89	1.26	*	11.29	4.56	12.95	4.63	1.66	*
Correctly Placed	1.51	2.25	2.47	2.50	.92	*	4.82	3.69	6.00	3.81	1.18	*
Proportions	3.62	2.05	4.72	2.67	1.10	*	6.82	3.18	7.84	3.73	1.06	*
3-Dimensional	1.58	2.24	2.41	3.01	.83	*	4.13	3.49	6.29	4.16	2.16	.05
Whole Figure	9.66	2.54	9.76	2.01	.11	*	9.66	2.54	9.76	2.01	.11	*
Technique	4.08	2.54	5.10	2.76	.82	*	7.16	2.80	9.26	2.67	2.08	.01

* No Significant Gain

Technique

Discussion

Encouragement

Control

In each teaching program, the kindergarten made greater gains than the pre-kindergarten. Kindergarten children in all teaching programs made significant gains, including the Control kindergarten, who made more 3-D Details and improved in their Technique in the posttest. The Pre-kindergarten Control Group made no significant improvement. The Encouragement kindergarten gained significantly in subtests Recognizability, Physical Details, Correctly Placed Details, and Proportions, but not in 3-D, Whole Figure, or Technique. The Encouragement Pre-kindergarten improved only in number of Physical Details ($P < .01$) and in Proportions ($P < .05$).

The Discussion Kindergarten gained in five out of seven subtests; the Discussion Pre-kindergarten gained in four out of seven subtests. The Technique kindergarten and pre-kindergarten made significant gains in all seven subtests.

Therefore, we can say that in this study, pre-kindergarten children made little or no improvement in their skills with clay without some specific intervention. Observation and Discussion helped them improve even in their clay technique and 3-dimensional representation, as well as in making more recognizable, better proportioned figures. With help with the medium, the pre-kindergarten children in the Technique Group made gains significant at the .001 level of confidence in the areas of detail and relationships, and at least at the .05 level of confidence in subtests related to clay technique, 3-Dimensions, and Whole Figure. Clay was a valuable medium for pre-kindergarten if the adult helped the child develop concepts; and clay was even more valuable when the adult helped him cope with the medium.

While the kindergarten children in the Technique Teaching Program made the greatest gains, the kindergarten children in programs with less intervention also made significant gains in cognitive clay subtests. Clay was a useful medium for helping kindergarten children to develop clay cognitive abilities, given the opportunity to use the clay on a frequent and regular basis. The more intervention they had in all systems involved in sculpturing-clay-objects, the greater the improvement they made.

TABLE 80

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF THE PRE-KINDERGARTEN AND OF KINDERGARTEN CHILDREN IN EACH TEACHING PROGRAM ON THE SCULPTURAL CLAY SCALE

	PRE-KINDERGARTEN							KINDERGARTEN						
Sculptural Clay Scale Person + Dog	N	Pretest		Posttest		Mean Gain	Sig. of Gain	N	Pretest		Posttest		Mean Gain	Sig. of Gain
		Mean	S.D.	Mean	S.D.				Mean	S.D.	Mean	S.D.		
						ENCOURAGEMENT								
Overall	38	4.50	1.54	5.74	1.35	1.24	.01	42	5.50	1.47	5.67	1.28	.17	*
Surface	25	4.46	1.27	4.85	1.22	.39	*	31	4.42	1.26	4.58	1.03	.16	*
Space	25	5.04	1.76	5.77	1.73	.73	*	31	5.77	1.23	5.48	1.59	-.29	*
Unity	25	5.08	1.88	5.96	1.76	.88	*	31	6.03	1.47	6.52	1.44	.49	*
Expression	25	4.73	2.33	6.58	1.65	1.85	.01	31	5.97	2.06	6.45	1.65	.58	*
Utility	25	4.65	1.85	6.15	1.74	1.50	.05	31	5.68	1.74	5.94	1.69	.26	*
						DISCUSSION								
Overall	41	4.30	1.42	6.19	1.85	1.89	.01	36	6.00	1.58	7.00	1.58	1.00	.01
Surface	28	4.20	1.06	4.35	.97	.15	*	25	4.73	1.22	4.84	.94	.11	*
Space	28	4.80	1.35	6.79	2.26	1.99	.01	25	5.92	1.38	7.20	1.94	1.28	.05
Unity	28	4.60	1.45	6.62	2.11	2.02	.01	25	6.27	1.34	7.92	1.41	1.65	.01
Expression	28	4.90	1.85	6.93	3.00	2.03	.01	25	6.23	1.97	7.64	2.02	1.41	.05
Utility	28	4.87	1.36	6.86	2.22	1.99	.01	25	6.31	1.59	7.84	1.55	1.53	.05
						TECHNIQUE								
Overall	29	4.43	1.52	7.05	2.00	2.62	.01	40	5.48	2.03	9.62	2.23	4.14	.01
Surface	19	4.15	.75	5.42	1.95	1.27	.01	28	4.35	1.50	6.77	1.82	2.42	.01
Space	19	5.05	1.28	7.17	2.37	2.12	.01	28	5.52	2.13	9.74	2.68	4.22	.01
Unity	19	4.85	1.27	7.54	2.36	2.69	.01	28	5.52	2.06	10.13	2.46	4.61	.01
Expression	19	5.60	2.01	7.83	2.71	2.23	.01	28	6.28	3.25	10.90	2.53	4.62	.01
Utility	19	4.80	1.32	7.50	2.38	2.70	.01	28	5.52	2.31	10.32	2.66	4.80	.01
						CONTROL								
Overall	39	4.59	1.85	4.87	1.51	.28	*	38	5.71	1.61	6.42	1.91	.71	*
Surface	26	4.48	1.27	4.45	1.27	- .03	*	25	4.46	1.03	5.22	1.32	.76	*
Space	26	4.55	1.55	5.00	1.95	.45	*	25	5.89	1.80	5.96	1.99	.07	*
Unity	26	4.76	1.75	4.69	1.73	- .07	*	25	5.85	1.95	7.44	2.23	1.59	.01
Expression	26	4.93	2.00	5.35	1.72	.42	*	25	6.23	2.31	7.96	2.92	1.73	.05
Utility	26	4.45	1.53	5.03	1.97	.58	*	25	5.62	1.86	6.61	2.23	.99	*

* No Significant Gain

Table 80 presents the achievement of the pre-kindergarten compared with the kindergarten children in each teaching program on the Sculptural Clay Scale. Table 81 summarizes the mean gain on Overall score and the significance of the gain for each group by grade. In the Overall evaluation of the artistic qualities of figures made by the children, the pre-kindergarten made significant gains ($P<.01$) in all teaching programs except the Control Group; the kindergarten children made significant gains only in the Discussion and Technique groups, the Technique Group making the largest gains of all.

TABLE 81 TEACHING PROGRAMS IN RANK ORDER OF ACHIEVEMENT ON OVERALL SCULPTURAL CLAY BY GRADE

	Pre-kindergarten		Kindergarten	
Teaching Program	Mean Gain	Sig. of Gain	Mean Gain	Sig. of Gain
Technique	2.6	.01	4.1	.01
Discussion	1.9	.01	1.0	.01
Encouragement	1.2	.01	.2	NS
Control	.3	NS	.7	NS

On the detailed Sculptural Scale (Table 80) the teaching groups had varying effects, but the hierarchy of gains was similar to the Overall. The Technique Group made the largest gains in both grades and was the only group to increase in surface treatment. In the Discussion Group, pre-kindergarten made somewhat larger gains than the kindergarten. The Encouragement Group pre-kindergarten made gains in two out of five subtests, while the kindergarten made no significant gains. In the Control Group, the pre-kindergarten made no improvement, but the kindergarten made improvement in Expression and Utility.

These results lead us to believe that young disadvantaged children do not improve in their artistic achievement without intervention. Although the intervention focused on the cognitive aspects of clay sculpturing, the children who had that intervention made significant improvement in the artistic aspects of their products. We can assure educators that guidance in observation and discussion and assistance with dealing with the clay medium was not detrimental to the child's artistic expression in this study. In the population of this study, children who did not have such guidance did not make artistic improvement on their own.

Again we may note in Table 80 that pre-kindergarten children with intervention made means on the posttest as high or higher than the kindergarten children in the Control Group.

Drawing: Pre-kindergarten and Kindergarten

Do younger or older children make more transfer from clay to drawing? Does the type of teaching make a difference in the amount of transfer by either grade (age)?

Table 82 presents the achievement on the Harris-Goodenough Drawing Test of the children in each teaching program by grade. In the pre-kindergarten population of this study, the Technique Group and the Encouragement Group made the greatest gains (5 points I.Q.). We note, however, that in pre-kindergarten those two groups had much lower pretest drawing scores than the Discussion and Control group. All pre-kindergarten groups reached approximately the same posttest mean in drawing. The kindergarten children who had clay intervention made significantly more improvement in drawing on the Harris-Goodenough Drawing Test than the children in the Control Group.

TABLE 82 MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF PRE-KINDERGARTEN AND KINDERGARTEN CHILDREN
IN EACH TEACHING PROGRAM
ON THE HARRIS-GOODENOUGH DRAWING TEST

Teaching Program	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	PRE-KINDERGARTEN					
Encouragement	74.82	12.75	80.92	12.51	5.50	.05
Discussion	77.36	14.46	80.00	10.49	2.57	NS
Technique	73.34	13.99	78.98	11.31	5.61	.05
Control	79.00	13.21	80.69	9.83	1.63	NS
	KINDERGARTEN					
Encouragement	78.57	11.42	85.52	11.19	6.95	.05
Discussion	79.10	13.83	87.08	9.79	7.74	.01
Technique	82.02	11.73	89.87	11.50	7.84	.01
Control	81.50	10.74	84.13	12.56	2.63	NS

An interesting contrast can be seen in the change in rank order of achievement of the four groups of kindergarten children between pretest and posttest:

TABLE 83 COMPARING KINDERGARTEN PRETEST AND POSTTEST RANK ORDER OF TEACHING PROGRAMS ON THE HARRIS-GOODENOUGH DRAWING TEST

Teaching Program	Pretest Mean Score	Teaching Program	Posttest Mean Score
Technique	82.0	Technique	89.9
Control	81.5	Discussion	87.1
Discussion	79.1	Encouragement	85.5
Encouragement	78.6	Control	84.1

The kindergarten children who had more intervention made the largest gains in drawing. Pre-kindergarten children made improvement in drawing also, but the gains were less significant statistically. (Table 82.)

The results of the evaluation of the two grade levels by the Drawing Observation Scale (Table 84) were very similar to the results of the Harris-Goodenough Drawing Test. Comparison of the significance of the improvement made by the pre-kindergarten groups is misleading because of differences between the pretest means of the four groups. Posttest means of the groups were similar and all pre-kindergarten groups, including the Control Group, made significant gains.

In the kindergarten groups, the pattern is clearer. The Control Group made significant gains only in Recognizability and Technique (P .05). The Technique Group, who began with pretest means similar to the Control Group, made significant gains in all subtests at the .001 level of confidence, except Perspective ($P<.01$). The Encouragement and Discussion Groups started lower than the other two groups, but made posttest means similar to the Control Group.

In summary, we can say that clay intervention does influence drawing achievement in both grades. Both grades made greater gains in drawing in relationship to the number of systems in which we intervened. Kindergarten children made more transfer from clay to drawing as a result of intervention in clay than pre-kindergarten children.

Verbal Cognitive Tests: Pre-kindergarten and Kindergarten

We have already seen that in the Experimental Group both grade levels made significant gains on the Verbal Cognitive Tests. We have also seen that the Technique Group made larger gains than any other group. We needed

TABLE 84 MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF PRE-KINDERGARTEN AND KINDERGARTEN CHILDREN
IN EACH TEACHING PROGRAM
ON THE DRAWING OBSERVATION SCALE

Drawing Observation Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	ENCOURAGEMENT GROUP - PRE-KINDERGARTEN (N = 39)					
Recogn.	5.79	2.76	7.82	2.62	2.03	.01
Physical Det.	9.92	5.24	4.95	5.12	5.03	.001
Correctly Pl.	2.82	2.65	4.85	3.79	2.03	.05
Perspective	7.49	1.12	8.26	1.33	.77	.05
Proportions	3.97	1.74	6.05	2.35	2.08	.001
Technique	5.62	2.54	7.16	2.63	1.47	.05
	DISCUSSION GROUP - PRE-KINDERGARTEN (N = 44)					
Recogn.	6.70	3.43	8.34	3.10	1.56	.05
Physical Det.	12.02	7.37	15.25	5.44	3.23	.05
Correctly Pl.	5.57	4.44	6.09	3.96	.52	*
Perspective	7.41	1.39	8.16	.86	.75	.05
Proportions	5.07	2.82	6.34	2.94	1.27	.05
Technique	4.75	2.25	6.77	2.82	2.02	.01
	TECHNIQUE GROUP - PRE-KINDERGARTEN (N = 40)					
Recogn.	5.02	2.86	7.82	2.07	2.20	.001
Physical Det.	9.57	6.82	14.55	4.77	4.98	.001
Correctly Pl.	2.52	2.87	5.07	3.83	2.55	.01
Perspective	7.08	1.40	7.80	.82	.72	.055
Proportions	4.17	1.96	5.90	2.05	1.73	.01
Technique	5.92	2.43	6.85	1.75	1.00	*
	CONTROL GROUP - PRE-KINDERGARTEN (N = 39)					
Recogn.	5.92	2.78	8.20	2.64	2.28	.001
Physical Det.	10.82	4.64	15.72	4.43	4.90	.001
Correctly Pl.	3.13	3.08	6.29	4.20	3.67	.001
Perspective	7.87	.47	8.08	.53	.21	*
Proportions	3.87	1.78	6.41	2.47	2.54	.001
Technique	4.67	2.02	7.03	2.97	2.34	.01

* No Significant Gain

TABLE 84
(Cont.)

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF PRE-KINDERGARTEN AND KINDERGARTEN CHILDREN IN EACH TEACHING PROGRAM ON THE DRAWING OBSERVATION SCALE

Drawing Observation Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	ENCOURAGEMENT GROUP - KINDERGARTEN (N = 42)					
Recogn.	9.69	2.82	11.31	2.63	1.62	.05
Physical Det.	16.38	5.49	19.26	4.13	2.88	.05
Correctly Pl.	6.69	4.49	9.05	3.71	2.36	.01
Perspective	8.00	.58	9.36	2.53	1.36	.001
Proportions	7.12	2.33	9.57	2.73	2.45	.001
Technique	6.81	2.02	9.07	2.60	2.27	.001
	DISCUSSION GROUP - KINDERGARTEN (N = 39)					
Recogn.	9.46	3.18	11.97	2.02	2.51	.001
Physical Det.	16.97	6.13	19.31	4.51	2.33	*
Correctly Pl.	8.26	3.85	10.13	3.75	1.87	.05
Perspective	7.92	.66	8.08	.70	.15	*
Proportions	7.26	3.45	9.36	2.23	2.10	.001
Technique	7.36	3.20	9.23	2.75	1.87	.05
	TECHNIQUE GROUP - KINDERGARTEN (N = 43)					
Recogn.	10.73	3.33	13.00	2.49	2.27	.001
Physical Det.	17.04	5.19	22.18	4.82	5.13	.001
Correctly Pl.	8.16	4.50	11.76	4.06	3.60	.001
Perspective	7.89	.65	8.98	1.77	1.09	.01
Proportions	7.13	2.69	10.73	3.43	3.60	.001
Technique	8.07	2.55	11.27	4.00	3.16	.001
	CONTROL GROUP - KINDERGARTEN (N = 37)					
Recogn.	10.24	2.82	11.74	2.96	1.50	.05
Physical Det.	17.03	4.02	19.37	5.22	2.34	*
Correctly Pl.	8.10	4.46	9.76	4.82	1.66	*
Perspective	7.95	.32	8.50	1.59	.55	*
Proportions	8.18	3.28	8.76	3.22	.58	*
Technique	7.61	2.77	9.24	3.37	1.61	.05

* No Significant Gain

to learn if the different teaching programs had different effects on the two different grade levels in developing the verbal cognitive skills.

Table 85 presents the achievement of each grade level within each teaching program. The table shows that both pre-kindergarten and kindergarten children in the Technique Teaching Program made significant gains in the Verbal Cognitive Tests. Both age groups made improvement on the WPPSI Verbal I.Q. which was significant at the .001 level of confidence; pre-kindergarten children made 9 points mean gain compared to 3 points for the Control Group; kindergarten children made 8 points mean gain compared to 2 points for the Control Group. The pre-kindergarten children in the Technique Teaching Program improved on all other cognitive tests and subtests except Embedded Figures. The kindergarten children made improvement in all tests and subtests except the WPPSI Arithmetic subtest. The gains reached significance at least at the .05 level of confidence in all subtests except Arithmetic and Picture Completion. Kindergarten children made more gains in Embedded Figure than pre-kindergarten children, but gains did not reach significance.

In the Encouragement Group, the pre-kindergarten children made more significant gains than the kindergarten in every test and subtest except WPPSI Vocabulary and Comprehension. Their gains reached significance in Clay Verbs ($P < .01$), Harris-Goodenough Drawing Test ($P < .05$), and WPPSI Verbal I.Q. ($P < .05$); the WPPSI Subtests, Information ($P < .05$), and Picture Completion ($P < .01$).

The kindergarten children in the Encouragement Group also made 4 points gain in Verbal I.Q., which was not statistically significant. Their Harris-Goodenough gain of 7 points was significant at the .05 level of confidence. The kindergarten also made a significant improvement in WPPSI Comprehension Subtest ($P < .05$).

In the Discussion Teaching Program, the kindergarten made more gains than the pre-kindergarten, reaching significance in Duplicates ($P < .05$) and the Harris-Goodenough Test ($P < .01$). (We have no data for the WPPSI on this group.) Pre-kindergarten children made significant gains in Duplicates ($P < .05$).

In summary, we can say that intervention in more systems in child-sculpturing-clay-objects results in more transfer to the verbal cognitive skills for both pre-kindergarten and kindergarten children. The Technique Group made the largest gain of any group in both grade levels. The Control Group made the fewest significant improvements on Verbal Cognitive Tests.

Summary: Finding 2:6

If we were to choose a clay teaching program for four- or five-year-old children, is one intervention method more effective than the others for either age group?

TABLE 85

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF PRE-KINDERGARTEN AND KINDERGARTEN CHILDREN IN EACH TEACHING PROGRAM ON VERBAL COGNITIVE TESTS

Cognitive/ Verbal Tests	Pretest Mean	Pretest S.D.	Posttest Mean	Posttest S.D.	Mean Gain	Sig. of Gain
ENCOURAGEMENT GROUP - PRE-KINDERGARTEN (N = 39)						
Clay Verbs	8.23	2.81	10.10	2.30	1.87	.01
Duplicates	3.58	2.61	5.27	3.03	1.69	*
Embedded Figure	49.16	9.51	52.40	10.43	2.87	*
Harris-Goodenough	74.82	12.75	80.92	12.51	5.50	.05
WPPSI Verbal I.Q.	91.31	11.52	97.08	10.35	5.77	.05
Information	7.80	2.41	9.03	2.84	1.23	.05
Vocabulary	8.13	2.39	8.23	1.86	.10	*
Arithmetic	9.26	2.07	10.10	1.89	.85	*
Similarities	10.00	3.40	11.05	2.91	1.05	*
Comprehension	8.33	2.77	9.23	2.49	.90	*
Picture Completion	8.44	3.18	10.77	2.94	2.33	.01
ENCOURAGEMENT GROUP - KINDERGARTEN (N = 42)						
Clay Verbs	10.93	2.65	11.83	2.12	.91	*
Duplicates	6.36	3.19	8.00	3.55	1.64	*
Embedded Figure	49.98	12.39	48.08	9.13	-1.90	*
Harris-Goodenough	78.57	11.42	85.52	11.19	6.95	.05
WPPSI Verbal I.Q.	94.95	14.35	99.00	14.26	4.05	*
Information	8.69	2.93	9.57	2.93	.88	*
Vocabulary	8.19	2.86	8.88	2.56	.69	*
Arithmetic	9.62	2.71	9.45	2.20	-.17	*
Similarities	10.26	3.03	11.10	3.20	.83	*
Comprehension	9.24	3.02	10.41	3.49	1.17	.05
Picture Completion	10.62	2.95	10.67	2.76	.05	*
DISCUSSION GROUP - PRE-KINDERGARTEN (N = 44)						
Clay Verbs	9.00	3.07	9.89	2.62	.89	*
Duplicates	4.30	2.96	6.07	4.01	1.78	.05
Embedded Figure	52.00	9.13	51.05	8.77	-.84	*
Harris-Goodenough	77.36	14.46	80.00	10.49	2.57	*
WPPSI Verbal I.Q.			95.73	11.49		
Information			9.21	2.72		
Vocabulary			7.96	2.05		
Arithmetic			9.80	2.23		
Similarities			10.71	3.06		
Comprehension			8.91	2.60		
Picture Completion			12.48	2.55		
DISCUSSION GROUP - KINDERGARTEN (N = 38)						
Clay Verbs	11.05	2.24	11.68	2.21	.53	*
Duplicates	5.96	2.35	8.16	3.52	2.20	.05
Embedded Figure	51.54	9.96	50.54	10.06	-1.03	*
Harris-Goodenough	79.10	13.83	87.08	9.79	7.74	.01
WPPSI Verbal I.Q.			94.97	10.49		
Information			9.39	2.30		
Vocabulary			8.54	1.78		
Arithmetic			8.49	2.21		
Similarities			10.33	2.29		
Comprehension			9.59	2.75		
Picture Completion			11.49	2.37		

* No Significant Gain

TABLE 85
(Cont.)

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF PRE-KINDERGARTEN AND KINDERGARTEN CHILDREN IN EACH TEACHING PROGRAM ON VERBAL COGNITIVE TESTS

Cognitive/ Verbal Tests	Pretest Mean	Pretest S.D.	Posttest Mean	Posttest S.D.	Mean Gain	Sig. of Gain
	TECHNIQUE GROUP - PRE-KINDERGARTEN (N = 40)					
Clay Verbs	6.97	3.03	10.75	3.18	3.79	.001
Duplicates	2.72	2.95	6.16	3.85	3.44	.001
Embedded Figure	46.90	11.54	46.43	11.12	- .48	*
Harris-Goodenough	73.34	13.99	78.98	11.31	5.61	.05
WPPSI Verbal I.Q.	84.25	10.58	93.48	11.03	9.23	.001
Information	6.85	1.76	8.55	1.91	1.70	.01
Vocabulary	6.58	2.09	7.85	2.11	1.28	.05
Arithmetic	8.45	2.70	9.50	1.99	1.05	*
Similarities	8.65	2.91	9.98	3.34	1.33	*
Comprehension	7.08	2.33	9.85	2.73	1.98	.01
Picture Completion	9.38	2.76	10.68	2.31	1.30	*
	TECHNIQUE GROUP - KINDERGARTEN (N = 45)					
Clay Verbs	10.27	3.19	13.60	2.33	3.33	.001
Duplicates	6.81	4.20	9.15	4.31	2.35	.05
Embedded Figure	50.98	9.62	52.86	10.69	1.89	*
Harris-Goodenough	82.02	11.73	89.87	11.50	7.84	.01
WPPSI Verbal I.Q.	97.13	13.19	105.09	13.60	7.82	.001
Information	9.62	3.03	11.36	2.62	1.73	.01
Vocabulary	8.64	2.71	10.27	3.24	1.62	.01
Arithmetic	9.69	2.46	9.62	2.75	- .07	*
Similarities	10.20	2.89	11.62	3.07	1.42	.05
Comprehension	9.64	2.45	11.13	2.67	1.49	.05
Picture Completion	11.64	2.53	12.31	2.51	.67	*
	CONTROL GROUP - PRE-KINDERGARTEN (N = 39)					
Clay Verbs	8.36	2.50	9.31	2.81	.95	*
Duplicates	3.80	2.97	4.60	3.14	.80	*
Embedded Figure	53.56	11.60	50.59	9.16	-2.97	*
Harris-Goodenough	79.00	13.21	80.69	9.83	1.63	*
WPPSI Verbal I.Q.	92.13	14.15	95.44	13.11	3.31	*
Information	8.31	2.54	8.56	2.79	.26	*
Vocabulary	7.54	2.42	8.72	2.41	1.18	.05
Arithmetic	9.54	3.25	9.82	2.36	.28	*
Similarities	10.36	3.38	10.64	3.27	.28	*
Comprehension	8.13	2.91	9.00	2.64	.87	*
Picture Completion	11.54	3.21	12.74	3.17	1.21	*
	CONTROL GROUP - KINDERGARTEN (N = 38)					
Clay Verbs	9.82	2.38	11.84	2.58	2.03	.01
Duplicates	6.21	2.90	8.04	3.32	1.83	*
Embedded Figure	47.11	7.50	47.25	9.17	.14	*
Harris-Goodenough	81.50	10.74	84.13	12.56	2.63	*
WPPSI Verbal I.Q.	93.95	14.00	96.00	13.78	2.05	*
Information	9.24	2.93	10.18	3.02	.95	*
Vocabulary	8.37	2.35	8.18	2.10	- .18	*
Arithmetic	9.71	2.89	9.32	2.67	- .40	*
Similarities	9.63	3.11	9.90	3.23	.26	*
Comprehension	8.32	2.65	9.63	2.69	1.32	.05
Picture Completion	11.03	2.92	10.76	2.92	-.26	*

* No Significant Gain

TABLE 86 MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM ON THE COGNITIVE CLAY SCALE

Cognitive Clay Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
Person + Dog	ENCOURAGEMENT - BOYS (N = 40)					
Recogn.	6.13	3.17	7.88	3.31	1.75	.05
Physical Det.	8.53	4.34	10.80	4.07	2.28	*
Correctly Pl.	2.85	3.09	3.85	2.73	1.00	*
Proportions	4.73	2.03	7.08	3.10	2.35	.01
3-D	3.71	3.27	3.93	4.29	.22	*
Whole Figure	9.63	2.54	9.38	2.52	- .25	*
Technique	6.78	2.56	7.67	2.77	.089	*
	ENCOURAGEMENT - GIRLS (N = 41)					
Recogn.	7.00	3.49	8.34	3.35	1.34	*
Physical Det.	9.34	5.27	13.20	4.23	3.85	.01
Correctly Pl.	3.71	3.71	5.85	3.61	2.15	.01
Proportions	6.27	3.08	8.37	3.11	2.10	.01
3-D	3.71	3.27	3.93	4.29	.22	*
Whole Figure	9.17	2.72	9.10	2.06	- .07	*
Technique	7.81	3.19	9.03	3.34	1.22	*
	DISCUSSION - BOYS (N = 42)					
Recogn.	5.86	3.78	8.76	4.12	2.91	.01
Physical Det.	8.29	5.28	10.81	5.84	2.52	.05
Correctly Pl.	3.98	3.61	4.55	3.74	.59	*
Proportions	5.41	3.67	7.24	3.63	1.83	.05
3-D	3.42	3.06	7.22	4.63	3.81	.01
Whole Figure	10.00	2.76	10.52	2.81	.50	*
Technique	6.41	4.28	8.83	4.21	2.42	.01
	DISCUSSION - GIRLS (N = 41)					
Recogn.	6.27	3.35	8.78.	4.06	2.51	.01
Physical Det.	9.85	5.35	12.12	5.32	2.27	*
Correctly Pl.	4.27	3.31	4.83	4.30	.56	*
Proportions	5.24	2.94	7.27	3.85	2.02	.01
3-D	3.42	3.06	7.22	4.63	3.81	.01
Whole Figure	8.68	1.84	9.90	1.93	1.22	*
Technique	5.78	2.67	9.08	4.03	3.30	.01

* No Significant Gain

TABLE 86 (Cont.)

MEANS, STANDARD DEVIATIONS, AND t-TESTS:
ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM
ON THE COGNITIVE CLAY SCALE

Cognitive Clay Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
Person + Dog	TECHNIQUE - BOYS (N = 43)					
Recogn.	5.35	3.60	9.61	4.65	4.26	.001
Physical Det.	6.86	4.89	12.05	6.31	5.19	.001
Correctly Pl.	1.88	2.86	6.33	4.44	4.44	.001
Proportions	4.12	2.82	8,19	4.73	4.07	.001
3-D	5.07	5.03	8.21	3.80	3.14	.01
Whole Figure	9.23	3.01	11.02	2.27	1.79	.05
Technique	6.88	3.05	9.60	4.49	2.82	.01
	TECHNIQUE - GIRLS (N = 42)					
Recogn.	7.21	4.09	11.62	3.80	4.41	.001
Physical Det.	9.43	5.68	16.26	5.85	6.83	.001
Correctly Pl.	3.91	3.58	8.48	4.47	4.57	.001
Proportions	5.57	3.47	9.60	3.77	4.02	.001
3-D	5.07	5.03	8.21	3.80	3.14	.01
Whole Figure	8.71	2.80	10.60	1.85	1.88	.01
Technique	7.00	2.67	11.69	3.89	4.69	.001
	CONTROL - BOYS (N = 39)					
Recogn.	6.60	3.64	8.03	3.75	1.43	*
Physical Det.	8.43	4.40	11.05	5.06	2.62	.05
Correctly Pl.	3.38	3.19	5.03	3.41	1.65	.05
Proportions	5.57	3.09	7.51	3.94	1.95	.05
3-D	2.68	3.14	3.63	4.00	.95	*
Whole Figure	9.84	2.66	9.65	2.07	- .19	*
Technique	5.89	3.05	7.84	3.72	1.95	.05
	CONTROL - GIRLS (N = 40)					
Recogn.	6.03	3.87	6.18	3.77	.15	*
Physical Det.	9.05	5.72	9.43	4.96	.38	*
Correctly Pl.	2.93	3.70	3.49	3.77	.56	*
Proportions	4.85	3.11	5.03	2.71	.28	*
3-D	2.68	3.14	3.63	4.00	.95	*
Whole Figure	8.68	2.65	8.53	2.05	- .15	*
Technique	5.33	3.12	6.53	3.19	1.20	*

* No Significant Gain

In re Clay: Both age groups profited most from the Technique Teaching Program in developing skills in clay sculpturing both cognitively and artistically. Therefore, we can say that the "fullest intervention" program would be first choice for either grade level. Pre-kindergarten children made little progress cognitively in the Control Group or Encouragement Group. They require some structured intervention. The kindergarten children were helped cognitively by all intervention groups, but they did not progress artistically without intervention.

In re Drawing: Both grades improved in drawing in relationship to the intervention provided, i.e., from most to least transfer: Technique, Discussion, Encouragement, Control. The kindergarten children made more significant improvement in drawing than the pre-kindergarten children. Therefore we can say that kindergarten children in the Technique Group made most use of clay intervention in improving their drawing capabilities. In choosing a program for kindergarten, the above order would be the order of preference. We can say that any intervention with clay, even frequent and regular experience, was of some assistance to either four- or five-year-olds.

In re Verbal Cognition: The Technique Training Program resulted in the greatest gains for both four- and five-year-olds. The four-year-old children in the Encouragement Group made more significant gains in verbal cognition than the five-year-olds.

In summary we can say that the intervention in the most systems of the child-sculpturing-clay-objects produced the most improvement in the children's development of clay, drawing, and verbal cognition in both younger and older children in this study of disadvantaged preschool children.

Finding 2:7 in re: The influence of the different teaching programs on the improvement in clay achievement, in drawing, and in all other verbal cognitive tests of the boys as compared with the girls.

Clay: Boys and Girls

We wanted to find out if any programs were better for boys or for girls in developing their clay skills. Table 86 presents the achievement on the Cognitive Clay Scale for boys and for girls within each teaching program. The boys and girls in each teaching program made similar gains. As we noted before, the boys in the Control Group made more improvement than the girls in the Control Group. However, with teaching and experience with clay, girls and boys made similar improvement within each group. The Technique Group made the most significant improvement in both sexes;

the Discussion Group was next highest; and the Encouragement Group was lowest. With only encouragement and no direct teaching, the boys improved by making more recognizable and better proportioned figures on the posttest. The girls in the Encouragement Group made significant gains in the number of Physical Details, Correctly Placed Details, and Proportions. Neither sex in the Encouragement program made significant improvement in the technical aspects of clay as a medium. In the Discussion program, children in both sexes improved in making 3-dimensional parts on their objects and in their general clay technique. In the Technique program, children of both sexes made significant gains in all clay subtests ($P < .01$).

In summary we can say that the girls made no improvement in clay sculpturing without teaching. With teaching, girls made similar gains to boys in the same group. The Technique Teaching Program helped children in both sexes develop most, then the Discussion Teaching Program, and finally the Encouragement Teaching Program.

In the sculptural aspects of clay, the Technique Group made the most significant improvement, with girls making greater gains than the boys (Table 87). The Discussion Group also made significant improvement, but the boys made larger gains than the girls. Neither sex in the Encouragement Group or the Control Group made appreciable improvement. In the Control Group, both the pretest and the posttest means of the boys were larger than those of the girls. Teaching helps rather than hinders the development of the artistic aspects of clay sculpturing in both sexes. Girls, especially, benefit from teaching and without it make little progress.

Drawing: Boys and Girls

Table 88 presents the drawing achievement of the boys and the girls in each group. The table shows that the girls in the Encouragement Teaching Program made the most significant improvement in the Harris-Goodenough Drawing Test (8 points). Girls in the Technique and Discussion programs also made improvement which did not reach significance. However, the girls in the Control Group gained less than 1 point on the drawing test compared to 5 to 8 points in the three teaching programs. Clay intervention made a definite difference for girls in their drawing.

The boys in the Technique Teaching Program made an 8.5 gain on the Harris-Goodenough Drawing Test ($P < .01$). The boys in the Discussion program made 5.6 points gain ($P < .05$). The Control boys made a gain of 3.7 which was not statistically significant, but was three points higher than the Control girls.

Thus, the girls in the group which had the least structured intervention made the largest gains in drawing. The boys in every group

TABLE 87

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM ON THE SCULPTURAL CLAY SCALE

Sculptural Clay Scale		Pretest		Posttest		Mean Gain	Sig.of Gain
		Mean	S.D	Mean	S.D.		
Person + Dog	N	BOYS - ENCOURAGEMENT GROUP					
Overall	40	5.08	1.73	5.90	1.32	.82	.05
Surface	28	4.48	1.38	4.79	1.32	.31	*
Space	28	5.52	1.53	5.86	1.63	.34	*
Unity	28	5.69	1.71	6.18	1.31	.49	*
Expression	28	5.38	2.46	6.32	1.77	.94	*
Utility	28	5.21	2.13	6.07	1.61	.86	*
		BOYS - DISCUSSION GROUP					
Overall	40	5.05	1.99	6.78	2.02	1.73	.01
Surface	26	4.70	1.27	4.69	1.09	- .01	*
Space	26	5.63	1.64	7.54	2.42	1.91	.01
Unity	26	5.41	1.74	7.58	2.21	2.17	.01
Expression	26	5.56	2.17	7.77	3.05	2.21	.01
Utility	26	5.67	1.90	7.92	2.35	2.25	.01
		BOYS - TECHNIQUE GROUP					
Overall	41	5.09	1.92	8.07	2.72	2.98	.01
Surface	23	4.25	1.36	5.96	2.11	1.71	.01
Space	23	5.46	1.69	8.35	3.33	2.89	.01
Unity	23	5.21	2.00	8.46	3.20	3.25	.01
Expression	23	6.21	2.92	8.92	3.55	2.71	.01
Utility	23	5.29	1.83	8.58	3.33	3.29	.01
		BOYS - CONTROL GROUP					
Overall	37	5.60	1.82	6.03	1.72	.43	*
Surface	23	4.70	1.26	4.78	1.13	.08	*
Space	23	5.61	1.64	5.87	1.84	.26	*
Unity	23	5.78	1.73	6.52	2.17	.74	*
Expression	23	5.87	2.03	7.04	2.44	1.17	*
Utility	23	5.22	1.62	6.22	2.22	1.00	*

* No Significant Gain

TABLE 87
(Cont.)

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM ON THE SCULPTURAL CLAY SCALE

Sculptural Clay Scale		Pretest		Posttest		Mean Gain	Sig. of Gain
		Mean	S.D.	Mean	S.D.		
Person + Dog	N	GIRLS - ENCOURAGEMENT GROUP					
Overall	40	4.98	1.42	5.51	1.29	.53	*
Surface	28	4.39	1.13	4.62	.90	.23	*
Space	28	5.36	1.55	5.38	1.66	.02	*
Unity	28	5.50	1.75	6.35	1.86	.85	*
Expression	28	5.43	2.06	6.69	1.51	1.26	*
Utility	28	5.21	1.55	6.00	1.81	.79	*
		GIRLS - DISCUSSION GROUP					
Overall	40	5.13	1.40	6.38	1.41	1.25	.01
Surface	26	4.21	1.01	4.46	.88	.25	*
Space	26	5.03	1.24	6.46	1.64	1.43	.05
Unity	26	5.35	1.54	6.89	1.57	1.54	.01
Expression	26	5.48	1.86	6.79	2.03	1.31	*
Utility	26	5.41	1.35	6.75	1.38	1.34	.05
		GIRLS - TECHNIQUE GROUP					
Overall	42	4.97	1.89	8.81	2.19	3.84	.01
Surface	25	4.28	1.14	6.38	1.88	2.10	.01
Space	25	5.20	1.98	8.86	2.34	3.66	.01
Unity	25	5.28	1.62	9.48	2.15	4.20	.01
Expression	25	5.80	2.74	10.14	2.34	4.34	.01
Utility	25	5.16	2.15	9.55	2.40	4.39	.01
		GIRLS - CONTROL GROUP					
Overall	40	4.73	1.72	5.28	1.97	.55	*
Surface	23	4.31	1.06	4.79	1.50	.48	*
Space	23	4.88	1.85	5.07	2.09	.19	*
Unity	23	4.91	1.97	5.41	2.47	.50	*
Expression	23	5.31	2.36	6.07	2.76	.76	*
Utility	23	4.84	1.89	5.35	2.18	.51	*

* No Significant Gain

TABLE 88

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM ON THE HARRIS-GOODENOUGH DRAWING TEST

Teaching Program	BOYS						
	N	Pretest		Posttest		Mean Gain	Sig. of Gain
		Mean	S.D.	Mean	S.D.		
Encouragement	40	74.43	11.79	79.78	10.83	5.35	NS
Discussion	39	77.05	13.59	82.63	10.46	5.58	.05
Technique	42	75.43	13.66	83.88	12.96	8.45	.01
Control	36	78.69	11.40	82.43	11.25	3.74	NS
	GIRLS						
Encouragement	40	79.15	12.17	86.76	12.19	7.61	.01
Discussion	41	79.32	14.66	84.00	11.04	4.68	NS
Technique	41	80.73	12.86	85.62	12.30	4.89	NS
Control	40	81.65	11.53	82.35	11.53	.70	NS

made gains in drawing, but the boys in the Technique program, the program with intervention in the most systems of child-sculpturing-clay-objects, made the most progress in drawing.

Table 89 compares the achievement of the boys and girls in each teaching program on the Drawing Observation Scale. Both boys and girls made gains in drawing in each group, but here again the gains do not tell the whole story. In each teaching program, the girls started with higher pretest scores than the boys. The Control Group boys and girls were most nearly alike on the pretest and their posttest means were similar to each other. Girls also made higher posttest means than the boys in each experimental teaching program, but because of the higher pretest means, the girls' gains are not significantly greater than the boys'. Although the girls made improvement in drawing in all teaching programs, the girls in the Technique program made the highest gains and achieved higher posttest means than any other group.

TABLE 89

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM ON THE DRAWING OBSERVATION SCALE

Drawing Observation Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	BOYS- ENCOURAGEMENT GROUP (N = 40)					
Recogn.	6.75	3.24	8.95	3.30	2.20	.01
Physical Det.	10.98	5.70	15.38	4.66	4.40	.01
Correctly Pl.	3.63	4.06	5.60	3.66	1.98	.05
Proportions	4.90	2.58	7.30	3.13	2.40	.01
Perspective	7.28	.98	8.78	2.25	1.20	.01
Technique	5.38	1.89	7.77	2.75	2.33	.01
	BOYS - DISCUSSION GROUP (N = 42)					
Recogn.	7.29	3.56	9.52	3.45	2.24	.01
Physical Det.	12.50	7.41	15.76	5.21	3.26	.05
Correctly Pl.	6.07	4.78	7.69	4.31	1.62	*
Proportions	5.81	3.60	7.50	2.97	1.69	.01
Perspective	7.38	1.36	8.10	.76	.71	*
Technique	5.52	2.93	7.38	2.97	1.86	.05
	BOYS - TECHNIQUE GROUP (N = 43)					
Recogn.	7.51	3.90	9.77	3.57	2.26	.01
Physical Det.	11.56	6.83	16.40	5.70	4.84	.01
Correctly Pl.	4.63	4.60	7.28	4.93	2.65	.01
Proportions	5.26	2.49	7.74	3.61	2.49	.01
Perspective	7.29	1.26	7.88	.86	.61	*
Technique	6.76	2.66	8.17	3.45	1.51	.05
	BOYS - CONTROL GROUP (N = 37)					
Recogn.	7.51	3.19	9.86	3.28	2.35	.01
Physical Det.	13.49	5.02	17.03	4.72	3.54	.01
Correctly Pl.	5.49	4.88	8.35	4.54	2.87	.01
Proportions	5.81	3.15	7.78	3.16	1.97	.01
Perspective	7.95	.33	8.22	.98	.27	*
Technique	5.76	2.28	8.08	3.04	2.32	.01

* No Significant Gain

TABLE 89
(Cont.)

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING PROGRAM ON THE DRAWING OBSERVATION SCALE

Drawing Observation Scale	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	GIRLS - ENCOURAGEMENT GROUP (N = 41)					
Recogn.	8.85	3.26	10.29	2.87	1.44	.05
Physical Det.	15.51	5.99	18.95	4.92	3.44	.01
Correctly Pl.	6.00	4.01	8.42	4.43	2.42	.01
Proportions	6.29	2.44	8.44	2.99	2.15	.01
Perspective	7.93	.82	8.88	1.98	.95	.01
Technique	7.08	2.47	8.54	2.77	1.45	.05
	GIRLS - DISCUSSION GROUP (N = 41)					
Recogn.	8.78	10.47	10.59	2.87	1.78	.01
Physical Det.	16.24	6.58	18.59	5.26	2.34	*
Correctly Pl.	7.61	3.80	8.29	4.41	.68	*
Proportions	6.39	2.98	8.02	3.09	1.63	.01
Perspective	7.93	.76	8.15	.85	.22	*
Technique	6.44	3.07	8.49	3.03	2.05	.01
	GIRLS - TECHNIQUE GROUP (N = 42)					
Recogn.	9.17	4.02	11.38	3.59	2.21	.01
Physical Det.	15.55	6.77	20.83	5.76	5.29	.01
Correctly Pl.	6.41	4.76	9.98	5.11	3.57	.01
Proportions	6.24	3.02	9.19	3.78	2.95	.01
Perspective	7.74	.96	8.95	1.82	1.21	.01
Technique	7.42	2.75	10.17	3.97	2.81	.01
	GIRLS - CONTROL GROUP (N = 40)					
Recogn.	8.55	3.79	10.03	3.36	1.48	.05
Physical Det.	14.25	5.64	17.98	5.52	3.73	.01
Correctly Pl.	5.68	4.28	8.18	4.96	2.50	.01
Proportions	6.18	3.64	7.38	3.03	1.20	.05
Perspective	7.88	.46	8.35	1.37	.48	*
Technique	6.40	3.25	8.18	3.66	1.65	.05

* No Significant Gain

In summary, the boys made similar progress in drawing in all groups including the Control Group. Girls in all groups also made gains, but girls who had clay intervention made more improvement in drawing than the girls in the Control Group.

Verbal Cognitive Tests: Boys and Girls

We have seen previously that the children in the Technique Teaching Program made greater gains in cognition than the other teaching programs. Many studies of young children indicate significant differences between verbal cognitive development of boys and girls. We wanted to know if any method of clay intervention was more successful than the others for helping either sex group develop their verbal cognitive capabilities.

Table 90 presents the achievement of the boys and girls in each teaching program on the Verbal Cognitive Tests. In the Technique Group, both boys and girls made significant gains. A careful analysis of the pre- and posttest means shows that the girls' means, both pre- and posttest, are slightly higher than the boys'. Although the gains of the sex group were similar on the WPPSI Verbal I.Q. and Subtests, the boys' gains were slightly higher than the girls'. On the Harris-Goodenough, the boys made 8 points gain, significant at $P < .01$ level of confidence. The Technique girls made larger gains on Clay Verbs, Duplicates, and Embedded Figures than any other sex group in Table 90.

In each group, except the Control Group, the girls had higher posttest mean scores than the boys, but the significance of the gain the boys made is encouraging. If we intervene in a medium in which the boys have success (clay), they do improve in verbal cognition capabilities. In every group, the boys had significant gains in more tests than the girls.

In summary, based on the data we have, the Technique method was best for both boys and girls in improving their verbal cognition. Boys in all groups, including the Control Group, made greater gains than the girls. In each group, except the Control Group, girls made higher posttest scores than the boys.

Summary: Finding *in re* Question II.

We wanted to know the influence of the different teaching programs on the improvement of children's verbal and cognitive capabilities as represented in clay, drawing, and verbal tests.

Table 91 summarizes the significance of the gains of the children in each teaching program in the media we used for testing.

Results:

(1) Children in all programs made more improvement than the Control Group in clay and verbal achievement. There was

TABLE 90

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING GROUP IN VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
ENCOURAGEMENT GROUP - BOYS (N = 40)						
Clay Verbs	9.65	2.88	10.90	2.56	1.25	.05
Duplicates	4.40	2.77	5.80	2.97	1.40	*
Embedded Figure	48.92	11.23	48.76	9.71	-.16	*
Harris-Goodenough	74.43	11.79	79.78	10.38	5.35	*
WPPSI Verbal I.Q.	92.13	13.01	98.23	14.83	6.10	.01
Information	7.80	2.48	8.98	3.28	1.18	.05
Vocabulary	7.73	2.65	8.80	2.47	1.08	*
Arithmetic	9.48	2.44	9.63	2.34	.15	*
Similarities	10.08	3.10	11.03	3.31	.95	*
Comprehension	8.96	2.80	10.40	3.36	1.43	.05
Picture Completion	9.55	3.61	10.85	3.01	1.30	*
ENCOURAGEMENT GROUP - GIRLS (N = 41)						
Clay Verbs	9.61	3.21	11.10	2.18	1.49	.05
Duplicates	5.46	3.55	7.39	3.91	1.92	.05
Embedded Figure	50.20	10.95	51.46	10.12	.90	*
Harris-Goodenough	79.15	12.17	86.76	12.19	7.61	.01
WPPSI Verbal I.Q.	94.24	13.30	97.93	9.88	3.68	*
Information	8.71	2.88	9.63	2.44	.93	*
Vocabulary	8.59	2.56	8.34	2.03	-.24	*
Arithmetic	9.42	2.42	9.90	1.79	.49	*
Similarities	10.20	3.33	11.12	2.80	.93	*
Comprehension	8.63	3.06	9.29	2.72	.66	*
Picture Completion	9.59	2.86	10.59	2.67	1.00	*
DISCUSSION GROUP - BOYS (N = 41)						
Clay Verbs	9.79	3.03	10.46	2.61	.63	*
Duplicates	4.44	2.38	6.80	4.05	2.36	.01
Embedded Figure	51.76	10.15	49.17	9.04	-2.51	*
Harris-Goodenough	77.05	13.59	82.63	10.46	5.39	*
WPPSI Verbal I.Q.			94.41	11.66		
Information			9.00	2.59		
Vocabulary			8.24	1.53		
Arithmetic			9.19	2.27		
Similarities			10.45	2.97		
Comprehension			8.48	2.49		
Picture Completion			11.93	2.59		
DISCUSSION GROUP - GIRLS (N =41)						
Clay Verbs	10.15	2.76	10.98	2.54	.83	*
Duplicates	5.70	3.04	7.33	3.79	1.63	*
Embedded Figure	51.81	8.88	52.49	9.46	.68	*
Harris-Goodenough	79.32	14.66	84.00	11.04	4.68	*
WPPSI Verbal I.Q.			96.37	10.27		
Information			9.59	2.45		
Vocabulary			8.22	2.30		
Arithmetic			9.17	2.37		
Similarities			10.61	2.47		
Comprehension			9.49	2.87		
Picture Completion			12.10	2.44		

* No Significant Gain

TABLE 90
(Cont.)

MEANS, STANDARD DEVIATIONS, AND t-TESTS: ACHIEVEMENT OF BOYS AND GIRLS IN EACH TEACHING GROUP IN VERBAL COGNITIVE TESTS

Verbal Cognitive Tests	Pretest		Posttest		Mean Gain	Sig. of Gain
	Mean	S.D.	Mean	S.D.		
	TECHNIQUE GROUP - BOYS (N = 41)					
Clay Verbs	8.93	3.27	11.84	3.10	2.98	.01
Duplicates	3.75	3.47	5.63	4.34	1.88	.05
Embedded Figure	48.50	13.01	47.36	10.73	-1.14	*
Harris-Goodenough	75.43	13.66	83.88	12.96	8.48	.01
WPPSI Verbal I.Q.	88.37	13.66	97.88	14.14	9.51	.01
Information	7.81	2.81	9.61	2.93	1.79	.01
Vocabulary	7.26	2.76	8.77	3.03	1.51	.01
Arithmetic	9.07	2.89	9.49	2.61	.42	*
Similarities	8.86	3.16	10.28	3.26	1.42	.05
Comprehension	7.77	2.60	9.88	3.15	2.12	.01
Picture Completion	10.23	3.17	11.44	2.83	1.31	*
	TECHNIQUE GROUP - GIRLS (N = 42)					
Clay Verbs	8.60	3.77	12.69	3.07	4.10	.01
Duplicates	5.74	4.54	9.52	3.43	3.78	.01
Embedded Figure	49.57	7.90	52.24	11.46	2.76	*
Harris-Goodenough	80.73	12.86	85.62	12.30	5.12	*
WPPSI Verbal I.Q.	93.83	13.12	101.32	13.12	7.42	.01
Information	8.83	2.85	10.48	2.39	1.64	.01
Vocabulary	8.10	2.45	9.50	2.97	1.41	.05
Arithmetic	9.14	2.37	9.64	2.21	.50	*
Similarities	10.10	2.69	11.43	3.25	1.33	*
Comprehension	9.12	2.66	10.43	2.58	1.31	.05
Picture Completion	10.93	2.50	11.64	2.24	.71	*
	CONTROL GROUP - BOYS (N = 37)					
Clay Verbs	8.87	2.83	10.95	2.90	2.08	.01
Duplicates	5.26	3.03	6.70	2.88	1.44	*
Embedded Figure	52.03	11.56	50.69	7.80	-1.36	*
Harris-Goodenough	78.69	11.40	82.43	11.25	3.72	*
WPPSI Verbal I.Q.	93.54	12.58	98.19	12.43	4.65	.05
Information	8.97	2.82	9.92	3.15	.95	*
Vocabulary	7.78	2.66	8.81	2.21	1.03	*
Arithmetic	9.92	2.83	9.92	2.18	.00	*
Similarities	10.03	2.83	10.84	2.87	.81	*
Comprehension	8.10	2.80	9.70	2.43	1.60	.01
Picture Completion	12.22	3.42	12.49	3.59	.27	*
	CONTROL GROUP - GIRLS (N = 40)					
Clay Verbs	9.28	2.24	10.20	3.03	.93	*
Duplicates	4.73	3.29	5.92	4.21	1.19	*
Embedded Figure	49.03	8.91	47.44	10.28	-1.59	*
Harris-Goodenough	81.65	12.53	82.35	11.53	.70	*
WPPSI Verbal I.Q.	92.56	15.37	93.43	13.42	.88	*
Information	8.58	2.72	8.85	2.80	.28	*
Vocabulary	8.10	2.17	8.13	2.29	.03	*
Arithmetic	9.35	3.27	9.25	2.78	- .10	*
Similarities	9.98	3.63	9.75	3.52	- .23	*
Comprehension	8.33	2.78	8.95	2.85	.63	*
Picture Completion	10.43	2.43	11.10	2.44	.68	*

* No Significant Gain

TABLE 91

SUMMARY OF THE t-TESTS: SIGNIFICANCE OF THE GAINS OF EACH TEACHING PROGRAM AND THE SIGNIFICANCE OF THE EFFECT OF PROGRAMS ON THE ACHIEVEMENT OF CHILDREN IN CLAY, DRAWING, VERBAL COGNITION

Test and Subtests	Significance of the Gains				Sign.** of Effect of Teaching Programs
	Encourage.	Discuss.	Technique	Control	
COGNITIVE CLAY	(N = 81)	(N = 83)	(N = 85)	(N = 77)	
Recogn.	.05	.001	.001	*	.001
Physical Det.	.001	.052	.001	*	.001
Correctly Pl.	.01	*	.001	*	.001
Proportions	.001	.001	.001	.05	.001
3-Dimensional	*	.001	.001	.05	.001
Whole Figure	*	*	.001	*	.001
Technique	.05	.001	.001	.05	.001
SCULPTURAL CLAY					
Overall	.05	.01	.001	*	.001
Surface	*	*	.01	*	.001
Space	*	.01	.01	*	.001
Unity	.05	.01	.01	*	.001
Expression	.01	.01	.01	*	.001
Utility	.01	.01	.01	*	.001
Average	.01	.01	.01	*	.001
DRAWING					
Recogn.	.001	.001	.001	.001	*
Physical Det.	.001	.01	.001	.001	.077
Correctly Pl.	.001	*	.001	.001	.020
Proportions	.001	.001	.001	.001	.026
Perspective	*	*	.05	*	.022
Technique	.001	.001	.001	.001	*
VERBAL COGNITIVE					
Clay Verbs	.01	*	.01	.01	.001
Embedded Fig.	.05	.05	.01	*	*
Duplicates	*	*	*	*	*
Harris-Good.	.01	.01	.01	*	.098
WPPSI I.Q.	.01		.01	*	.001
Information	.01		.01	*	.007
Vocabulary	*		.01	*	.001
Arithmetic	*		*	*	*
Similarities	*		.01	*	.001
Comprehension	.05		.01	.01	.001
Pic. Completn.	.05		.05	*	*

* No Significant Gain

** Analysis of Variance Considering Group, Grade, Sex less difference between the groups in the achievement in drawing.

(2) In the Technique Teaching Program, which intervened in the most systems of child-sculpturing-clay-objects, the children of both age groups and both sexes made the most improvement in all the media.

(3) The Discussion Group and Encouragement Group both made significant gains in each media also.

(4) Pre-kindergarten children needed intervention in all systems of child-sculpturing-clay-objects in order to make significant gains in cognition represented in each medium.

(5) Kindergarten children also profited from clay teaching programs and made more transfer from clay to other media than pre-kindergarten children.

(6) Kindergarten children made more transfer to subjects not-taught than pre-kindergarten children.

(7) Boys of all groups, including the Control Group, made significant gains in clay and transferred improvements to other media.

(8) Girls made no significant gains without intervention, but made significant improvement in cognitive skills in all media when they were taught through clay.

(9) The Technique Teaching Program was the most beneficial to both boys and girls in developing their cognitive skills in all areas.

Based on the data from this study, we can make the following statements:

> If one were to select a teaching program for disadvantaged children that would benefit the most children in both sexes in Pre-kindergarten and Kindergarten, the evidence gathered in this study would indicate that the Technique Teaching Program would be the most productive.
>
> However, if one had limited time and resources for training teachers in technical aspects of clay, the Observation and Discussion Teaching Program, a method more familiar to teachers, would produce improvement in clay and transfer to other media fairly consistently.
>
> If, for some reason, neither of the above teaching programs were feasible, the Encouragement Teaching Program, which

> provides regular opportunities for children to work with clay with a supportive teacher, would bring about more development than programs without clay activities.

We conclude that clay activities, as part of a planned curriculum design, can make a valuable contribution to the verbal, cognitive, and artistic development of disadvantaged preschool children.

E. PROJECT OUTCOMES: RESEARCH QUESTIONS AND FINDINGS (Cont.)

Question III: What type of clay teaching program is best for which type of children?

Introduction

In answer to Question I, we found that children in the experimental clay teaching programs made more improvement in their clay, drawing, and verbal cognitive achievement than the children in the Control Group.

In answer to Question II, we found that the three experimental teaching programs were effective in improving children's achievement in clay, drawing, and verbal cognitive achievement in the following rank order:

Technique

Observation/Discussion

Encouragement

We now ask the question: "Are some methods of intervening in clay activities more effective than others in helping certain types of children to develop their clay and verbal cognitive capabilities?"

We have already considered in the two previous sections the relationship of the grade (age) and sex of the children to the effectiveness of the various teaching programs. We selected four other characteristics of the children to be considered, which might affect their mode of learning, and thus influence the choice of the "best method" of using clay with certain children. The four characteristics selected were:

1. Classroom adjustment of the child.
2. Intellectual ability of the child.
3. The clay sculptural ability of the child before intervention ("Clay Talent").
4. Talkativeness of the child before intervention.

One might consider these characteristics in terms of the model of the child-sculpturing-clay-objects as presented on Figure 1, page   :

Classroom Adjustment:	The cognitive-social-emotional-self the child brings to the task (affective).
Intellectual Ability:	The level of ability with which the child orders conceptual aspects of the task (cognitive).

Sculptural Ability: The level at which the child orders his hands to represent his concepts (psychomotor).

Talkativeness: The verbal counterpart of the sculptural ability. The level at which the child uses words to represent his concept.

A variable was selected to represent each of the four characteristics:

Classroom Adjustment: Total Adjustment Score from Scale for Teacher Evaluation of Student Adjustment in School

Intellectual Ability: WPPSI Verbal I.Q.

Sculptural Ability: Overall Score - Sculptural Clay Scale, Person + Dog

Talkativeness: Total Number of Words - Verbal Enumeration, Person + Dog

On the basis of a frequency distribution of the scores for each of the four variables, the children were divided into three levels for each characteristic: Low, Medium, High. Within each level the mean gains of the children in the three teaching programs were compared to see which program was most effective at that level. For example, "Which program was most effective in helping children who were evaluated as having low classroom adjustment to improve their cognitive capabilities in clay sculpturing and in verbal tasks?"

Organization of this section in answer to Question III.

The findings in this section are presented for each of the four characteristics separately with the following considerations:

the rationale;

test selection;

graphs, which visualize the comparative gains of the children in each teaching program at each level of ability; and,

discussion of the graphs.

In dealing with Question III, we will concentrate on the comparative gains made by different types of children in Cognitive Clay capability and in the Verbal Cognitive capabilities. We have seen that children's development of cognitive capability in clay sculpturing is accompanied by development of cognitive capability in other media. Therefore, we need to know which teaching programs were most effective in helping children with various abilities to develop the cognitive capabilities of clay sculpturing.

For the purpose of simplifying the presentation of the cognitive clay data, a total score for Cognitive Clay was calculated by finding the mean of the gains on the six subtests of the Cognitive Clay Scale which were most highly correlated with the standardized cognitive tests*:

Recognizability
Physical Details
Correctly Placed Details
3-Dimensional Details
Proportions
Technique

We have compared the Cognitive Clay mean gain (person + dog) of the three experimental teaching programs. Where a particular subtest was especially affected by the characteristic under discussion, these results are reported.

By analyzing the Verbal Cognitive Tests, we can see which teaching program promoted the most development in Verbal Cognitive capabilities, the primary purpose of this study. To represent the Verbal Cognitive abilities, we will report the comparative improvement of each teaching program for each level of ability on the following tests:

Clay Verbs: Vocabulary and comprehension related to clay activity;

Duplicates: Representation of the same details in two media (clay and words);

Harris-Goodenough Drawing Test: Performance I.Q.; and

WPPSI Verbal I.Q. Test: Verbal I.Q.

A complete discussion of this section and its implications would consume the space of a book. Discussion in this report is limited to some observations and brief generalizations and some speculation which should not be considered scientific conclusions. The reader is invited to read the graphs and study the comparisons as they speak for themselves.

---

* See Question I for further explanation.

Finding 3:1 in re: The influence of the different clay teaching programs on the development of clay and verbal cognitive skills of children with low, medium, or high intellectual ability as assessed by the Scale for Teacher Evaluation of Student Adjustment in School.

Rationale:

Clay has long been recognized as a medium for therapy for persons with emotional and psychological disturbances. Although we were most interested in this study to learn the effect of intervention through clay on cognitive development, we were aware that the child's self-concept, social, emotional, and cognitive adjustments to the classroom situation are important factors in learning. We wanted to know if one clay teaching program was more beneficial than another to children of various levels of adjustment in the classroom (e.g., What type of intervention is best for the poorly adjusted child? Does he need the full structure of the Technique Teaching Program or the encouragement to represent his own concepts?)

Test:

The total score of the Scale for Teacher Evaluation of Student Adjustment in School was used as the criterion for dividing the children into low, medium, and high adjustment groups. The instruction sheet is included on the next page to further explain this procedure. The Control Group is included in this analysis for comparison, as this is the only section in the report where classroom adjustment is discussed.

Graphs:

Figures 2 and 3 present the comparative gains on the Cognitive Clay Scale of each teaching program within each level of adjustment. Clay Person and Clay Dog are presented separately as differences appeared for the two subjects, particularly in the Encouragement and Control groups.

Scale for Teacher Evaluation of Student Adjustment in School
Prepared by Dr. Sara Smilansky

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The National Institute for Research in the Behavioral Sciences
Jerusalem, Israel

The Student Adjustment Scale has three broad factors of adjustment: Social, Emotional and Cognitive. The three factors include eighteen categories which represent an evaluation of the child according to the following aspects of the child's behavior:

Categories

A. Discipline
B. Aggression
C. Sociability
D. Leadership
E. Activity and Energy
F. Appearance

G. Cognitive Activity
H. Concentration
I. Interest
J. Ambition
K. Perseverance
L. Honesty

M. Self-Confidence
N. Emotional Balance
O. Mood
P. Independence
Q. Scapegoat
R. Acceptance of the child by the teacher

Directions for evaluation:

1. You have two booklets; one for all the boys in your classroom and the other for all the girls. Please rate first the boys on all categories in one booklet and then rate the girls in your other booklet.

2. On the last page of one booklet please write alphabetically the names of all the boys in your classroom, last name first. On the last page of the other booklet write the names of the girls.

3. Read the description for each number for Category "A" Discipline: Select the number that best describes each boy's rating in relation to the other boys in the class (in the second booklet each girl's rating in relation to the other girls in class). Place an "X" in the appropriate box.

4. Evaluate all boys on one category before going on to the next. You must score each child on each of the eighteen categories. Select the description that best describes his behavior.

FIG. 2 COGNITIVE CLAY: DOG

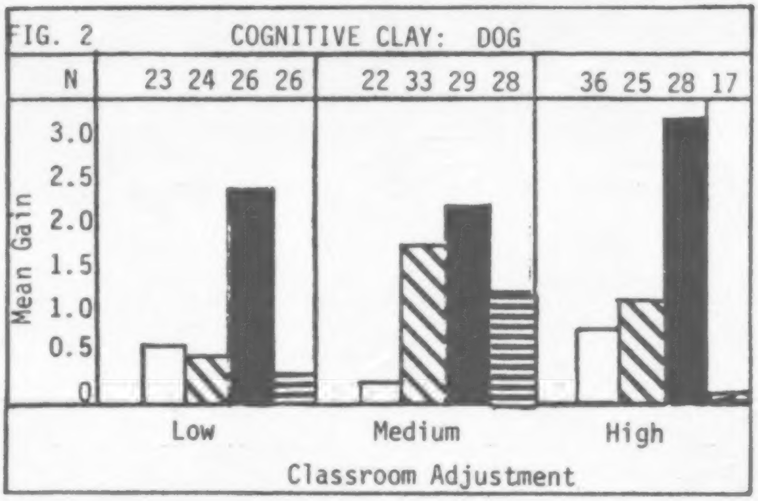
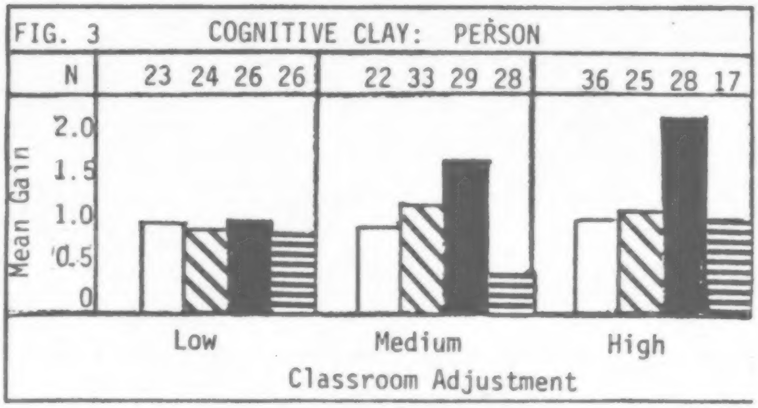


FIG. 3 COGNITIVE CLAY: PERSON



	Encouragement
▨	Discussion
■	Technique
▥	Control

Observations in re achievement in making a clay dog:

- At all levels of adjustment, the children in the Technique Teaching Program made most improvement in making a dog (the subject taught).
- Well-adjusted children (as evaluated by teachers) made the greatest gains in the Technique Group and the lowest in the Control Group. When they had instruction, the well-adjusted children made great gains in clay.
- Medium-adjusted children in the Discussion Teaching Program and the Control Group made more gains than the other children in either the higher or lower levels in those groups.
- Poorly-adjusted children made almost no improvement in making dogs without structured experience and technical intervention.

Observations in re achievement in making a clay person:

- Poorly-adjusted children made no transfer from subject taught to subject not taught. The Experimental children at this level made the same progress as the Control Group. This finding re-emphasizes the need of these children with lower classroom adjustment for structured direct experiences to promote learning.
- At the medium and high levels of adjustment, the Technique Group made the most gains in making a clay person. The other groups, including the Control Group, made similar gains at all adjustment levels in making a clay person.

Speculation:

Children who are judged by teachers as "well-adjusted" may be more passive, better learners-from-teachers, less "behavior" problems than other children. They learn most when taught directly. The children evaluated by teachers as the high and medium adjustment group may be more adventuresome and creative, less docile, and thus more successful with clay even without technique intervention.

Poorly-adjusted children need structured experiences in order to achieve.

Graphs:

Figures 4-7 present the comparative gains on Verbal Cognitive Tests of the three teaching programs, including the Control Group, within each level of adjustment.

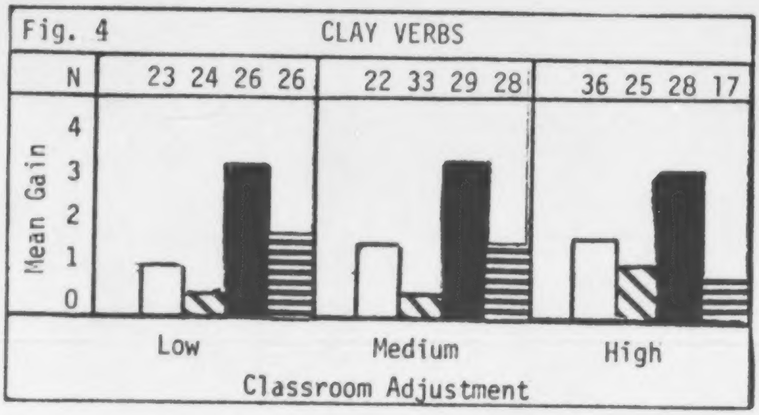


Fig. 4 CLAY VERBS

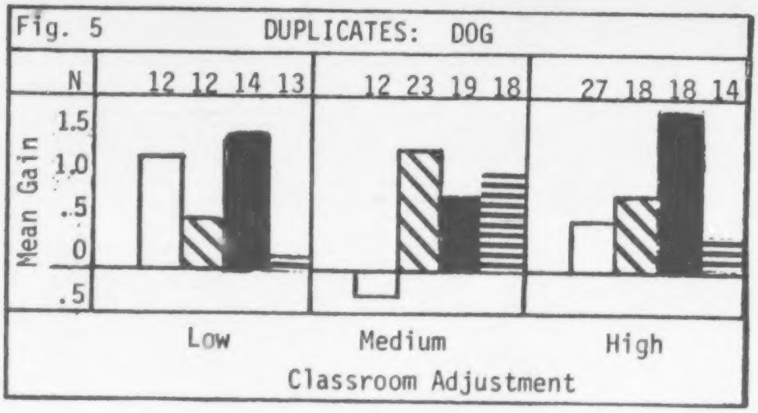


Fig. 5 DUPLICATES: DOG

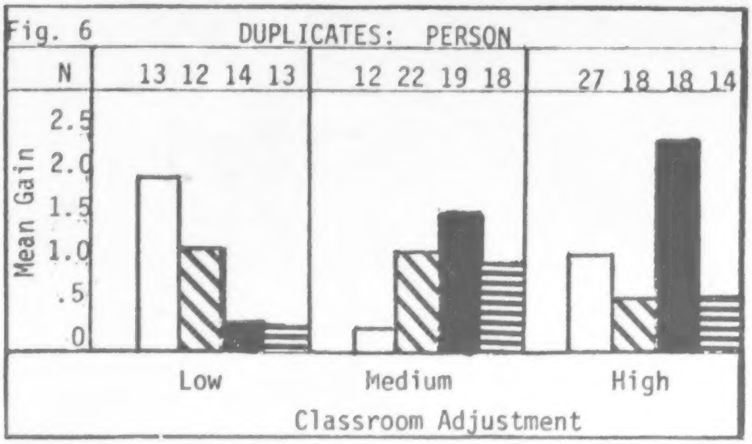


Fig. 6 DUPLICATES: PERSON

□	Encouragement
▨	Discussion
■	Technique
▥	Control

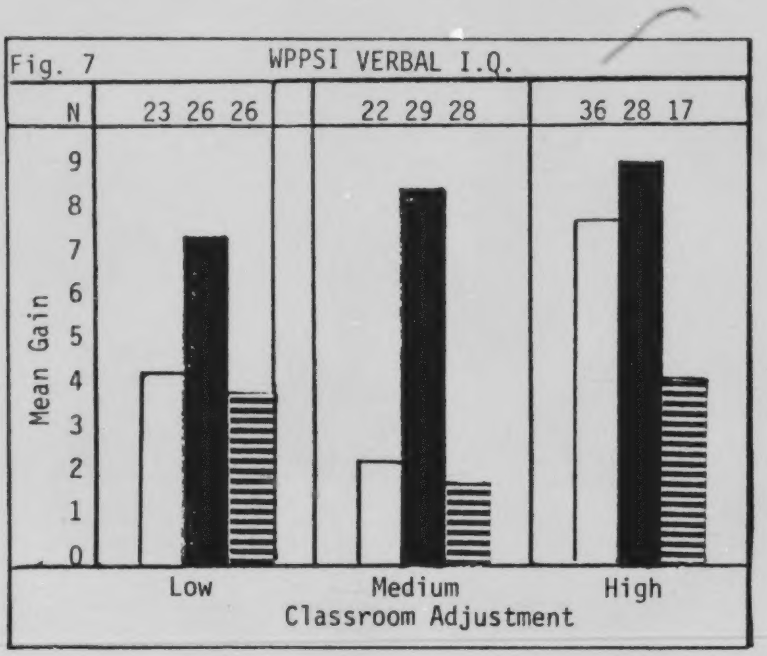


Fig. 7 WPPSI VERBAL I.Q.

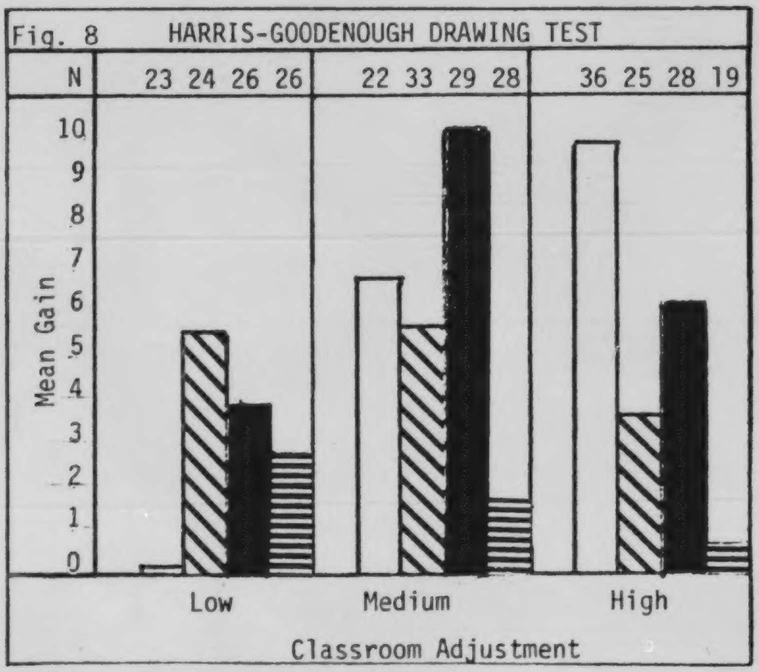


Fig. 8 HARRIS-GOODENOUGH DRAWING TEST

☐	Encouragement
▨	Discussion
■	Technique
▥	Control

Observations _in re_ effects of teaching programs and adjustment on cognitive tests:

- Children improved in Clay Verbs only with Technique intervention. Children in all adjustment levels made similar gains in Clay Verbs.

- Well-adjusted children made gains in the Technique Program on all the verbal tests; in the Encouragement Program they also were successful in improving both Verbal and Performance I.Q.

- Medium-adjusted children developed most in Verbal I.Q. within the Technique Program. All children at this level of adjustment improved in the Harris-Goodenough Drawing Test.

- In the Harris-Goodenough Drawing Test, children in all adjustment levels made from 4 to 5 points gain in the Discussion Program.

- Poorly-adjusted children made the most gains from direct teaching (Technique Group) in Clay Verbs, Duplicates (dog), and WPPSI Verbal I.Q.; children in the Encouragement Group made more gains in Duplicates (person) but no progress in the drawing test. The poorly-adjusted children in the Discussion Group made gains in Person Duplicates and in Performance I.Q. (Harris-Goodenough Drawing Test); both of which test areas of transfer in subject or media.

- Poorly- and medium-adjusted children in the Control Group made similar gains in Verbal I.Q. and in Drawing (Performance) I.Q. Well-adjusted children made more gain in Verbal I.Q. than in Drawing (Performance) I.Q.

- Classroom adjustment had the most effect on the success of the Encouragement Group on the Harris-Goodenough Drawing Test:

  Low adjustment - no progress
  Medium adjustment - 7 point gain
  High adjustment - 10 point gain

- Poorly-adjusted children did not improve their drawing representation when they had clay intervention in only the affective domain. They needed structured experiences with clay in order to improve their drawing.

- Intervention for the well-adjusted child produced significant gains in both Verbal and Performance I.Q. even without structured experiences with clay. In this case, it seems that intervening in the child's strong areas (self) helped him develop in other areas.

Summary.

Intervention in children's clay activities can help children of all levels of classroom adjustment develop clay sculpturing and cognitive capabilities.

The Technique Teaching Program helped children in most groups to develop verbal cognition skills.

The Discussion Teaching Program was quite effective for children with medium adjustment.

The Encouragement Teaching Program was effective in improving Verbal I.Q. scores of well-adjusted children and Drawing (Performance) I.Q. for medium-adjusted children.

Children who have made poor adjustments to the classroom situation need structured experiences and teaching such as they receive in the Technique Teaching Program or Discussion Teaching Program to succeed in most of the verbal cognitive tasks. Thus they have help in ordering themselves, the concept, the hands and guidance in checking the shape, their sensory feedback and percept.

Finding in re: 3:2 The influence of the different clay teaching programs on the development of clay and verbal cognitive skills of children with low, medium, and high intellectual ability as measured by the WPPSI Verbal I.Q. Test.

Rationale:

On the assumption that each teaching program intervenes in different systems of the child-sculpturing-clay-objects, we considered the possibility that children of different intellectual abilities might benefit from different methods of intervention in clay. For example, perhaps the intellectually more able child is helped more by a program in which he is free to explore and discover for himself, while the child with low intellectual ability may require more guided experiences and structure from the teacher.

Test:

The WPPSI Verbal I.Q. posttest was used as the criterion for determining levels of intellectual ability. A correlation of the pretest and the posttest indicated that the rank order of the children's achievement was similar in both tests. The problem encountered in pretesting of the Discussion Group caused an unrealistic upward skewness of the distribution of that group on the pretest. The posttest provided more reasonable grouping of children based on their ability. Thus, the WPPSI posttest scores of the 249 children in the Experimental Group were ranked and divided at the 33rd and 66th percentiles, resulting in the following groupings of the children for the purposes of this analysis:

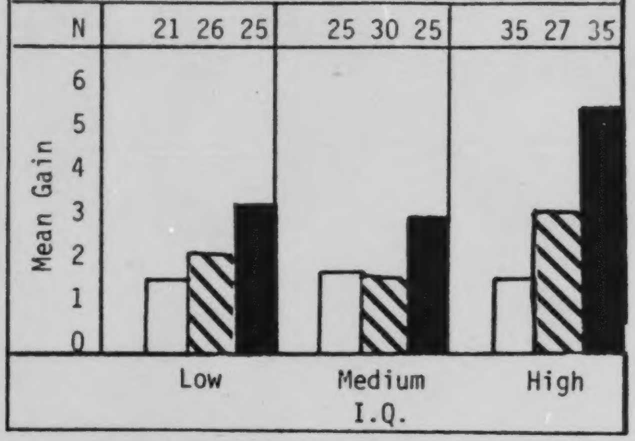
Low Ability	70 children
Medium Ability	80 children
High Ability	97 children

Each graph shows the number of children from each teaching program compared at each ability level.

Graphs:

Figure 9 presents the comparative gains on the Cognitive Clay Scale of the three teaching programs within each level of intellectual ability.

Fig.9 COGNITIVE CLAY: PERSON + DOG

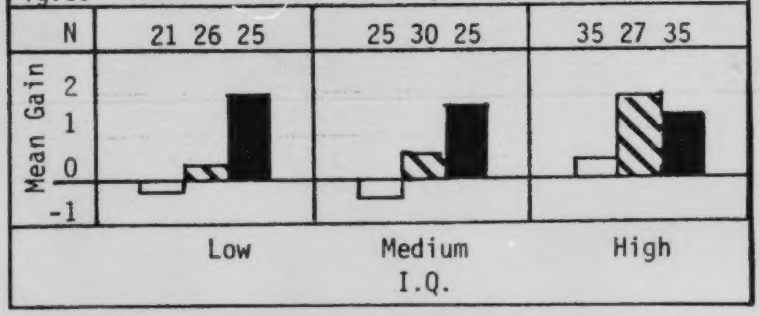


Observations:

- The children at each ability level made the greatest improvement in the Technique Teaching Program.
- The higher I.Q. children made the "best use" of teaching making the greatest gains in Clay Sculpturing in both the Technique and Discussion groups.
- Improvement in Clay Sculpturing in the Encouragement Group was the same at all levels of intellectual ability and therefore unrelated to I.Q.
- Children of all levels of intellectual ability benefit from teaching, and the more ability they had, the more progress they made in Clay Sculpturing.

Figure 10 presents the comparative gains on Clay, Whole Figure, at each level of intellectual ability.

Fig.10 CLAY: WHOLE FIGURE (PERSON + DOG)



☐	Encouragement
▨	Discussion
■	Technique

Observations:

- All levels in the Technique Group made similar gains in making clay objects upright.
- For the Discussion Group, gains increased in relationship to I.Q. level.
- Encouragement Group made no significant gains although higher I.Q. children increased their scores on Whole Figure, while others lost. As mentioned before, when one adds detail, the object has more difficulty in standing unless one has technical know-how within the medium of clay. Young children need instruction in the techniques needed for the medium in order to develop skill in making clay objects stand. Higher I.Q. children evidently use problem-solving effectively in the Discussion Group.

Figures 11-14 present comparative gains on Cognitive Tests of the three teaching programs within each level of intellectual ability.

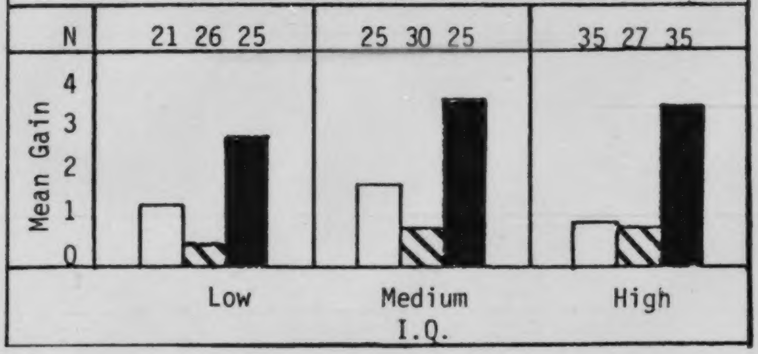


Fig. 11 CLAY VERBS

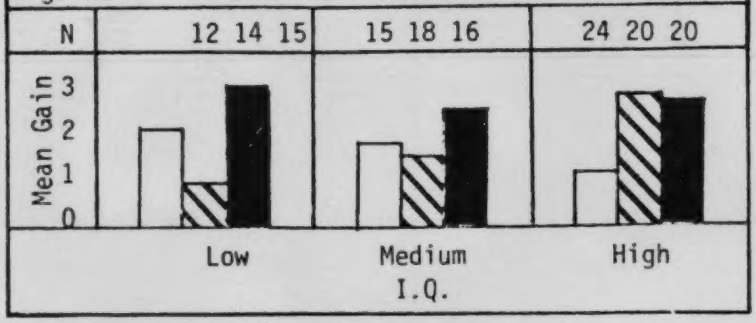


Fig. 12 DUPLICATES: PERSON + DOG

□ Encouragement
▨ Discussion
■ Technique

Fig 13 HARRIS-GOODENOUGH DRAWING TEST

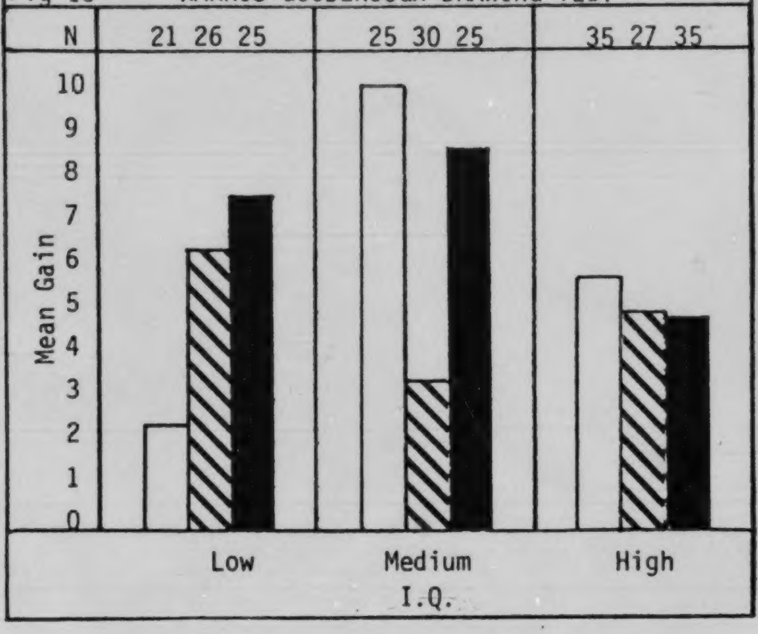
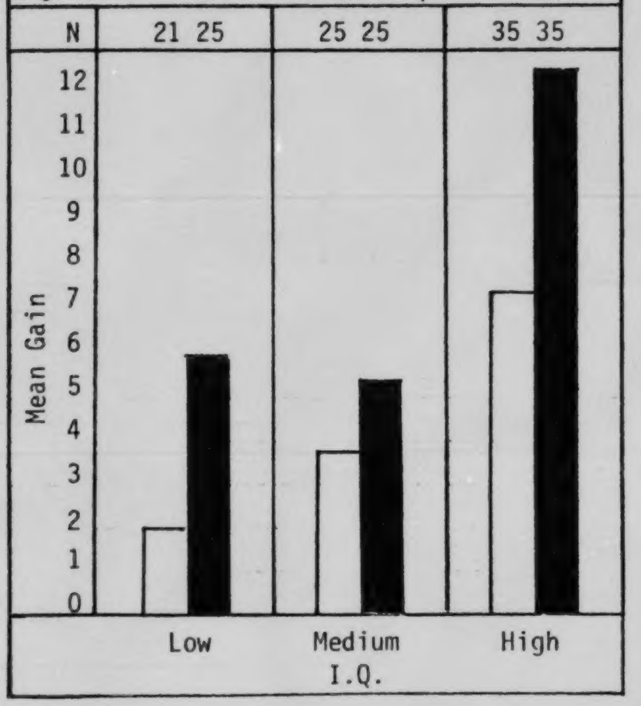


Fig. 14 WPPSI VERBAL I.Q.



☐ Encouragement
▨ Discussion
■ Technique

Observations:

- The Technique Teaching Program helped children at all levels of intellectual ability to develop cognitive skills.
- The Discussion Teaching Program gains in Duplicates were related to I.Q.
- On the Harris-Goodenough Drawing Test, the low I.Q. children profited most from the Discussion and Technique programs. The high I.Q. children in all groups made similar gains in Drawing (Performance I.Q.). The medium I.Q. group in the Encouragement Teaching Program made the greatest gains of any group at any level of I.Q.
- All levels made progress in Verbal I.Q. as a result of the Technique Program. The high I.Q. group made the greatest gains. Children with ability make the "best use" of teaching and experience. The gains of the Encouragement Group were related to I.Q. level.

Summary.

All clay teaching programs helped children improve their verbal cognitive skills.

At most levels in most tests, the Technique Group made the largest gains.

However, children with higher intellectual ability made gains in all groups.

Children with low intellectual ability made most gains from the structured experiences and technical instruction of the Technique Program. They improved their Performance I.Q. in the Discussion Program.

Finding 3:3 in re: The influence of the different clay teaching programs on development of clay and verbal cognitive skills of children with low, medium, or high clay sculpturing ability as measured by the pretest Overall Sculptural Clay Score.

Rationale:

We wanted to know which program was most beneficial in helping to develop the clay sculpturing skill of children who began intervention with higher levels of sculpturing ability. Which programs help children with the least ability? Perhaps the child who has a high ability only needs the opportunity to "practice" his skills, i.e., Encouragement Program; or, perhaps he can go no further until he has some technical instruction (Technique).

Test:

We chose the Sculptural Clay Scale--Overall Score--as the criterion for determining levels of what we shall call "clay talent" as a shortened expression for clay sculptural ability. In the first analysis which was done, we discovered that grade (age) had a highly significant effect on sculptural ability. Therefore, we re-analyzed the data for each grade separately in order to find the effect of teaching at each grade level.

Graphs:

Figures 15 and 16 present the comparative gains on the Cognitive Clay Scale at each level of beginning clay sculptural ability (clay talent) for Pre-kindergarten and Kindergarten.

Fig. 15
COGNITIVE CLAY: PERSON + DOG (PRE K.)

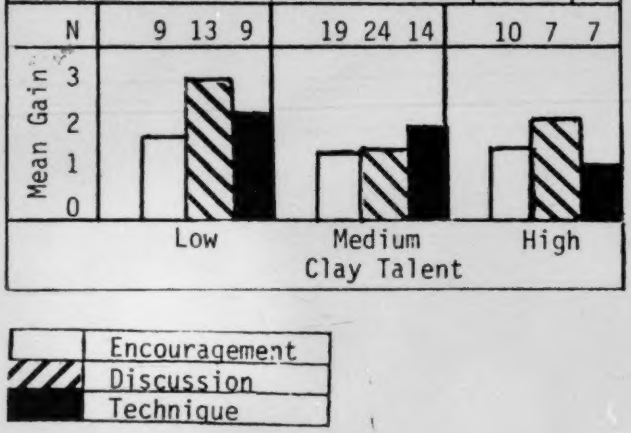
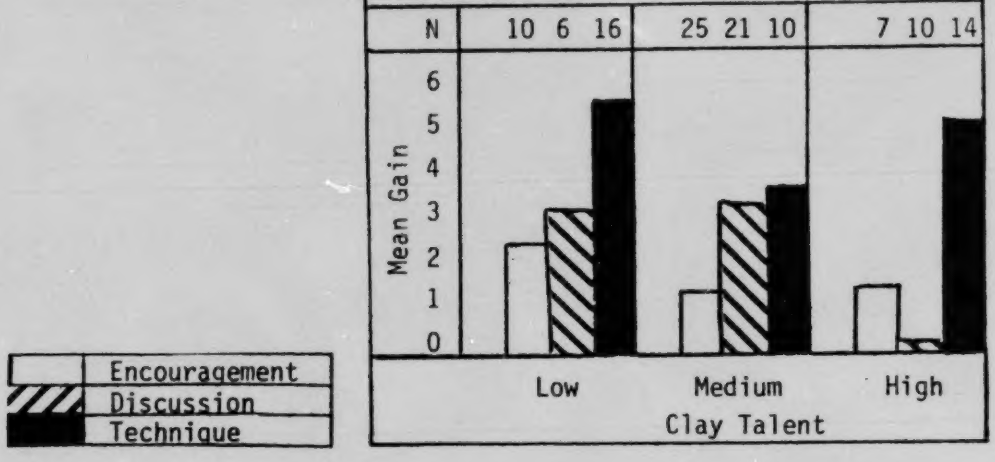


Fig. 16

COGNITIVE CLAY: PERSON + DOG (KDG.)



Observations:

- Method made very little difference in the gains of the Pre-kindergarten children at each level of beginning sculptural ability. The lower level children (sculpturally) made slightly more gain than the children in the other levels. The Discussion Group gained as much or more than the Technique Group. It is possible that the children in the lowest level sculpturally had no previous experience with clay, and they "caught up" with the other children.

- The Kindergarten children made greatest gains in the Technique Group, although the children in low and medium levels of sculptural ability also made gains in the Discussion Group.

- The children who were low at the beginning made great gains. Again, they may have been children without previous experience with clay.

- The children who were high in sculptural ability at the beginning made no progress without technical instruction. They seemed to have reached their capacity to develop skills on their own at their stage of maturity. However, given the added assistance in their area of strength (sculpturing), they made great progress. It would appear that the psychomotor (Technique) aspects of the Technique program was the forceful influence here as neither intervention in the affective or cognitive helped these children improve their clay sculpturing.

- Children in the medium level were able to use experiences of observation and discussion nearly as effectively as technique in order to improve their sculpturing ability.

Figures 17 and 18 compare the gains in Whole Figure at each level of sculptural ability for Pre-kindergarten and Kindergarten.

Fig.17 CLAY: WHOLE FIGURE (PERSON + DOG) (PRE-K.)

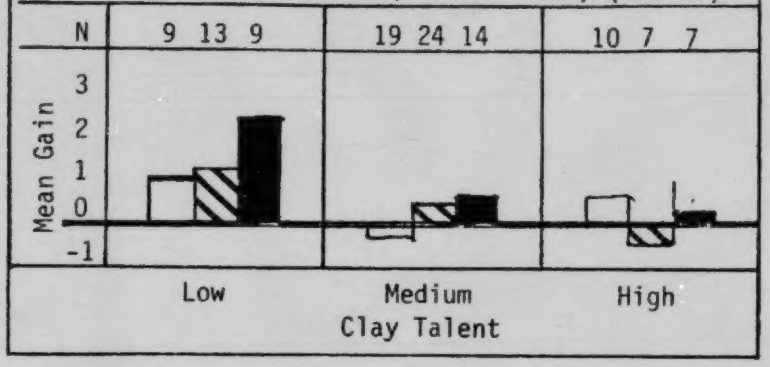
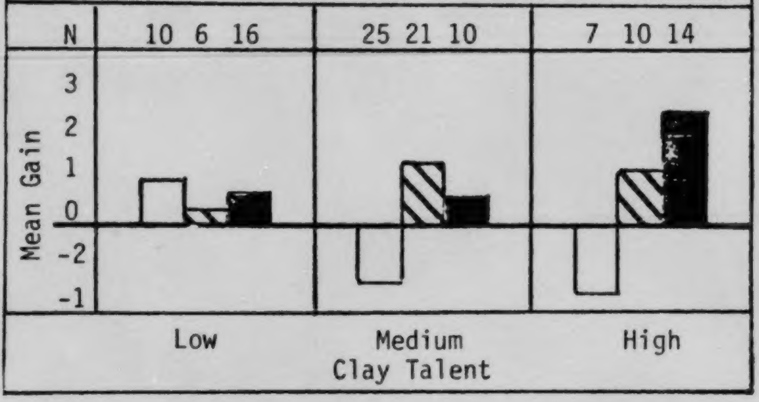


Fig. 18
CLAY: WHOLE FIGURE PERSON + DOG (KINDERGARTEN)



□	Encouragement
▨	Discussion
■	Technique

Observations:

- o Pre-kindergarten children with the lowest sculptural ability before intervention made greatest gains in making their clay figures upright. Those in the Technique Program made the greatest gains. Many of these children made nothing at all from their lump of clay or pounded it flat in their pretest. The other Pre-kindergarten children made little improvement in making figures stand.

- The Kindergarten children with the highest beginning ability made greatest gains in making upright figures, especially when they were taught techniques for working with clay. Children with medium and high sculptural ability in the Discussion Group also made gains. We assume that observation of the 3-D world and encouragement in problem-solving helped these children to improve.

- The medium and high ability children in the Encouragement Group made less standing figures. Again, we assume that this is related to their increase in making detailed objects with more parts which are more difficult to make stand.

- The low ability children's gains look similar to those of the medium ability Pre-kindergarten.

- Thus, we can say that regarding making standing clay figures, the Pre-kindergarten children at the lower end of the scale made gains when they were given technical instruction. Kindergarten children at the high end of the scale profited from instruction.

- Chronological age has strong influence on development of sculptural ability, and a certain level of readiness apparently is necessary in order for instruction to be effective.

Figures 19-22 present the comparative gains on cognitive tests of the three teaching programs within each level of clay sculptural ability ("clay talent") for Pre-kindergarten.

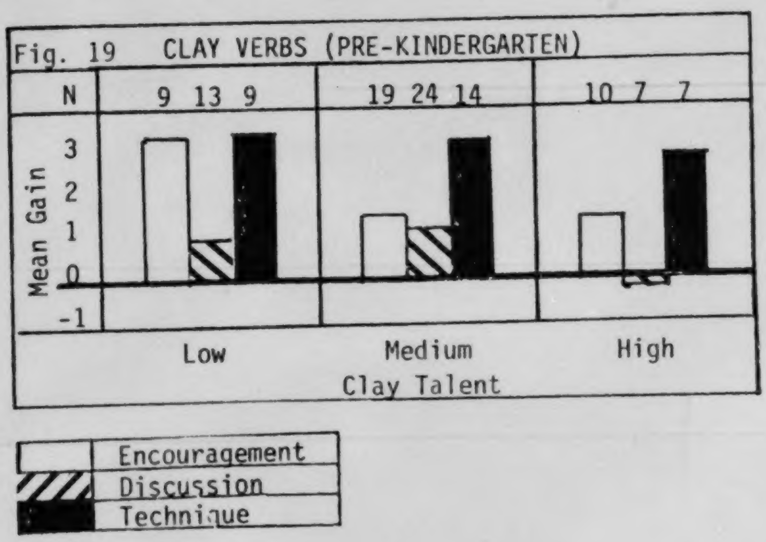


Fig. 19 CLAY VERBS (PRE-KINDERGARTEN)

Fig. 20 DUPLICATES: PERSON + DOG (PRE-K.)

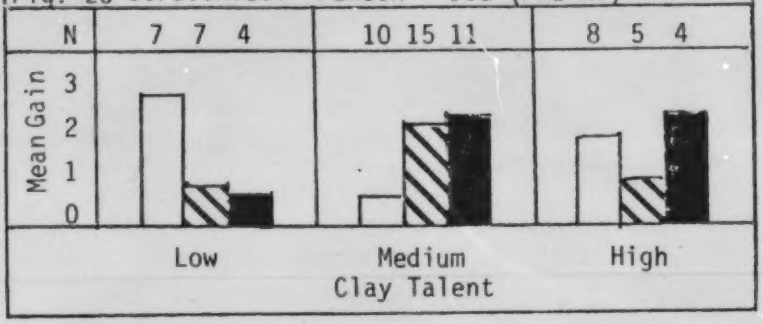


Fig. 21
HARRIS-GOODENOUGH DRAWING TEST (PRE-K.)

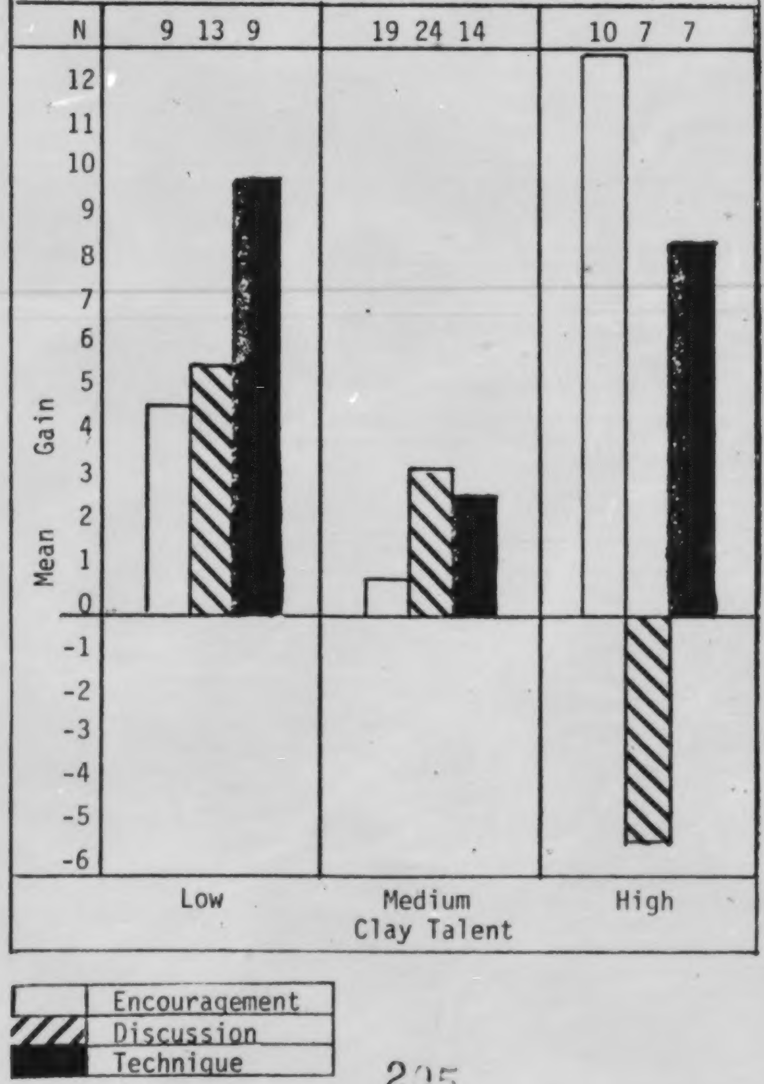
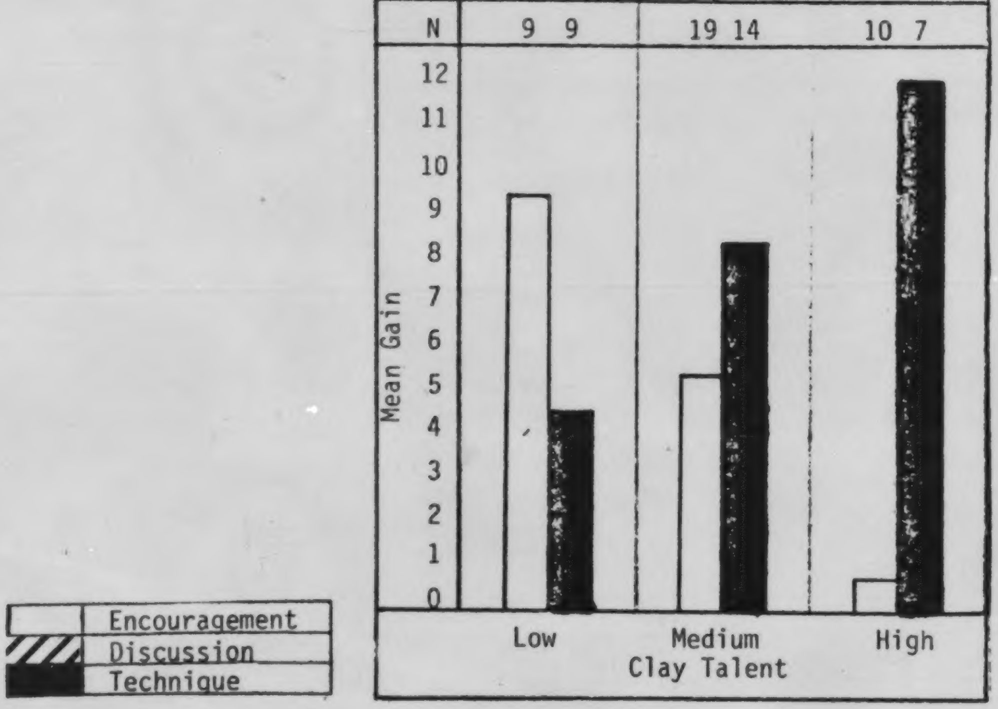


Fig. 22 WPPSI VERBAL I.Q. (PRE-K.)



Observations:

- o Particularly striking in these graphs is the gain of the children at the low sculptural ability level in the Encouragement Group in all cognitive tests. In Duplicates and Verbal I.Q., which are strictly verbal tests, the four-year-old children at the low level of sculptural clay ability who were free to explore the medium for themselves made the greatest gains in their group.
- o The only test in which the children in the Discussion and Technique groups gained more was the Harris-Goodenough Drawing Test--a performance test. In that test, the high ability children in the Encouragement Group made the greatest gains of any group at any level of sculptural ability.
- o Children with higher beginning ability made more cognitive progress in the Technique or Discussion groups. The high ability Pre-kindergarten children made 12 points gain on the WPPSI Verbal I.Q. when they had technical assistance.

- These graphs seem to confirm what we observed in the clay sessions. The young children who had no previous experience with clay and had "low sculptural ability" at the beginning of intervention seemed to require time to pound, manipulate, and to explore the possibilities of the clay on their own. Piaget has said that the young child needs to first experience the world in his own egocentric way before he can deal with the adult intervention or approach.

- Apparently the children in the higher ability groups were more ready to utilize the adult intervention. These children, however, when allowed to explore the medium of clay on their own, made great gains in drawing (more than 12 points gain in I.Q. on the Harris-Goodenough Drawing Test). The transfer to verbal achievement, however, came only through the most complete intervention with clay.

Figures 23-26 compare Kindergarten children's progress in verbal cognitive capabilities in relationship to their beginning clay sculptural ability.

Fig. 23 CLAY VERBS (KINDERGARTEN)

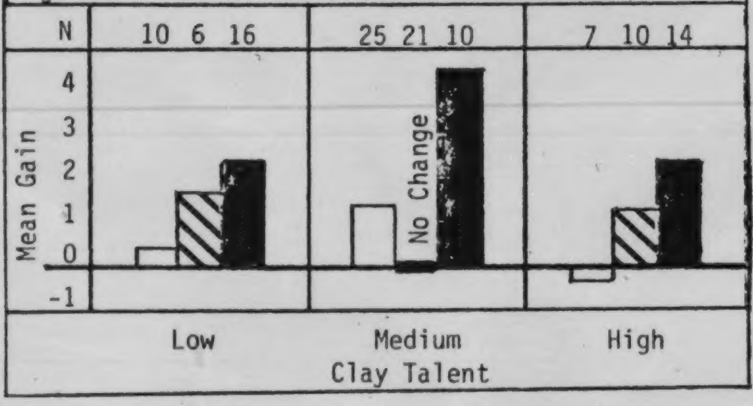
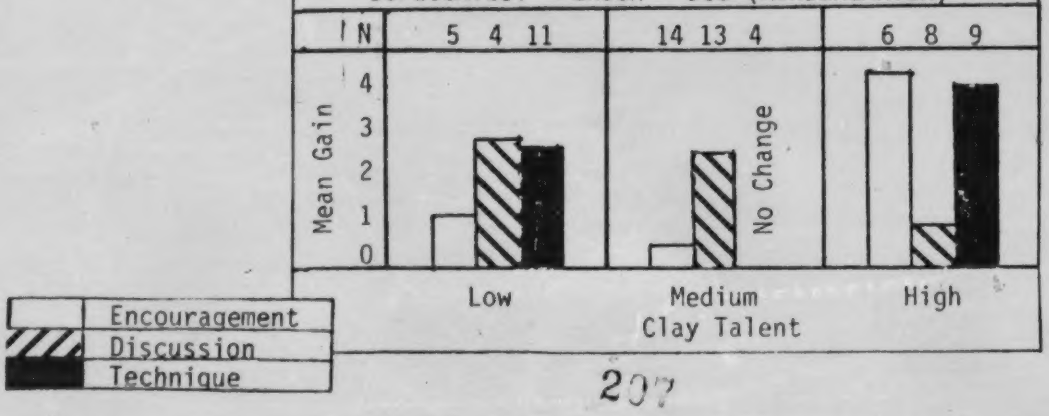


Fig. 24

DUPLICATES: PERSON + DOG (KINDERGARTEN)



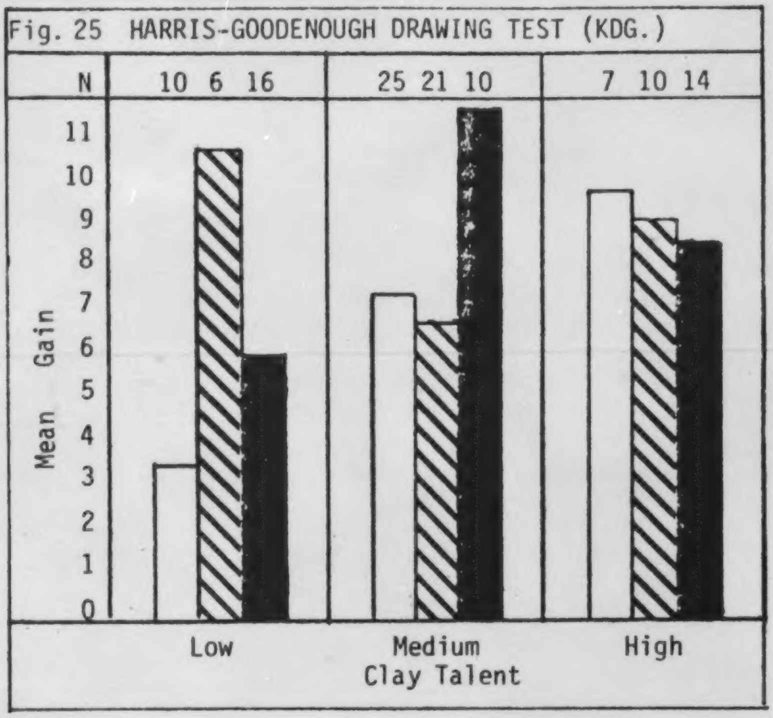


Fig. 25 HARRIS-GOODENOUGH DRAWING TEST (KDG.)

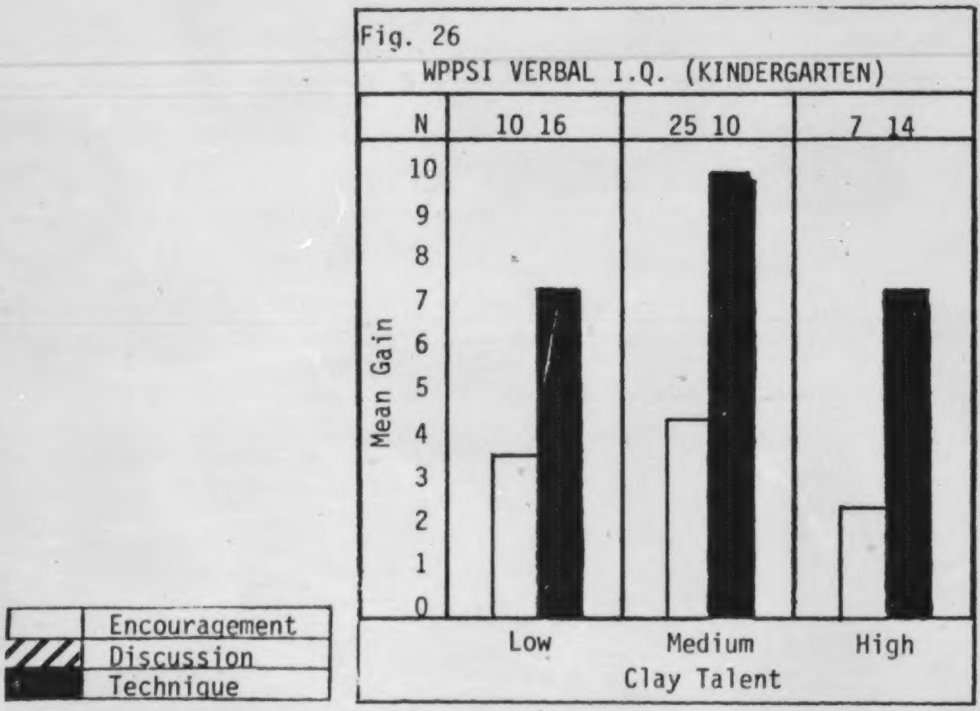


Fig. 26
WPPSI VERBAL I.Q. (KINDERGARTEN)

Observations:

- At this level of maturity, children at the lower and middle of the sculptural ability scale made the greatest improvement when they had teaching. Both the Discussion and the Technique programs were effective in developing most cognitive abilities.
- On the Harris-Goodenough Drawing Test, the low sculptural ability Discussion Group made the most gains in Drawing (Performance I.Q.). In the middle and higher sculptural levels, all three groups made significant gains in Drawing, the Technique Group being most effective for the middle level. The high ability Encouragement Group made as high gains in Duplicates as the Technique Group.
- Kindergarten children at all levels of sculptural ability gained in verbal ability through intervention with clay The more systems in which we intervened, the more cognitive improvement was the result.

Finding 3:4 in re: The influence of the different clay teaching programs on the development of cognitive clay and verbal cognitive capabilities of children with low, medium, and high levels of talkativeness as measured by their total number of words on the Verbal Enumeration Tests.

Rationale:

There are many media available for expression. Some people express with their hands and the arts better than verbally. If we intervene with a non-verbal medium to improve verbal and cognitive skills, will the less talkative child make the most improvement in clay as a medium of expression?

Test:

The total number of words the child said when he was asked to tell us "what a person has" and "what a dog has" was used as the criterion for this analysis. The distribution was divided at the 33rd and 66th percentiles, dividing the 249 children in the experimental groups on the basis of low, medium, and high talkativeness.

Graphs:

Figures 27-31 compare gains on cognitive clay and verbal cognitive tests of the three teaching programs at each level of talkativeness for Pre-kindergarten; Figures 32-36 present the Kindergarten.

Fig. 27
COGNITIVE CLAY: PERSON + DOG (PRE-K.)

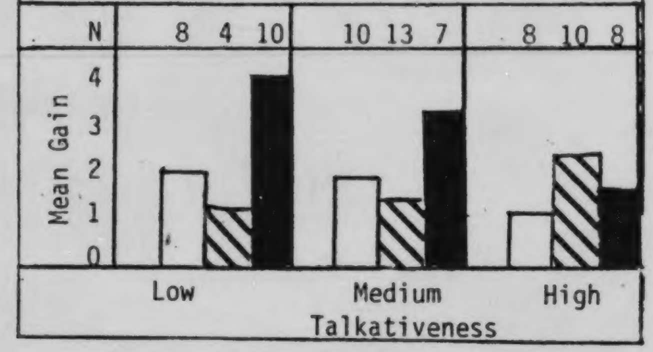


Fig. 28 CLAY VERBS (PRE-KINDERGARTEN)

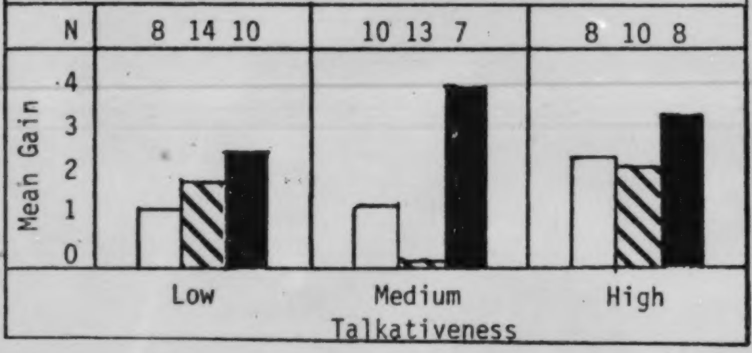


Fig. 29 DUPLICATES: PERSON + DOG (PRE-K.)

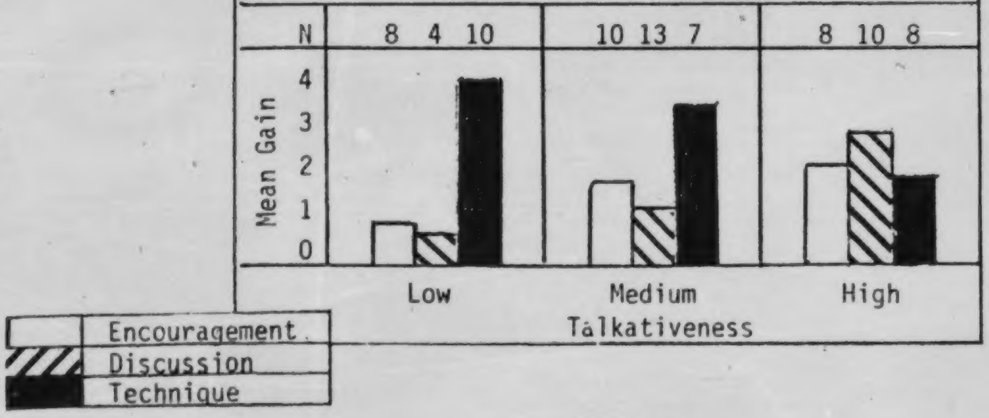
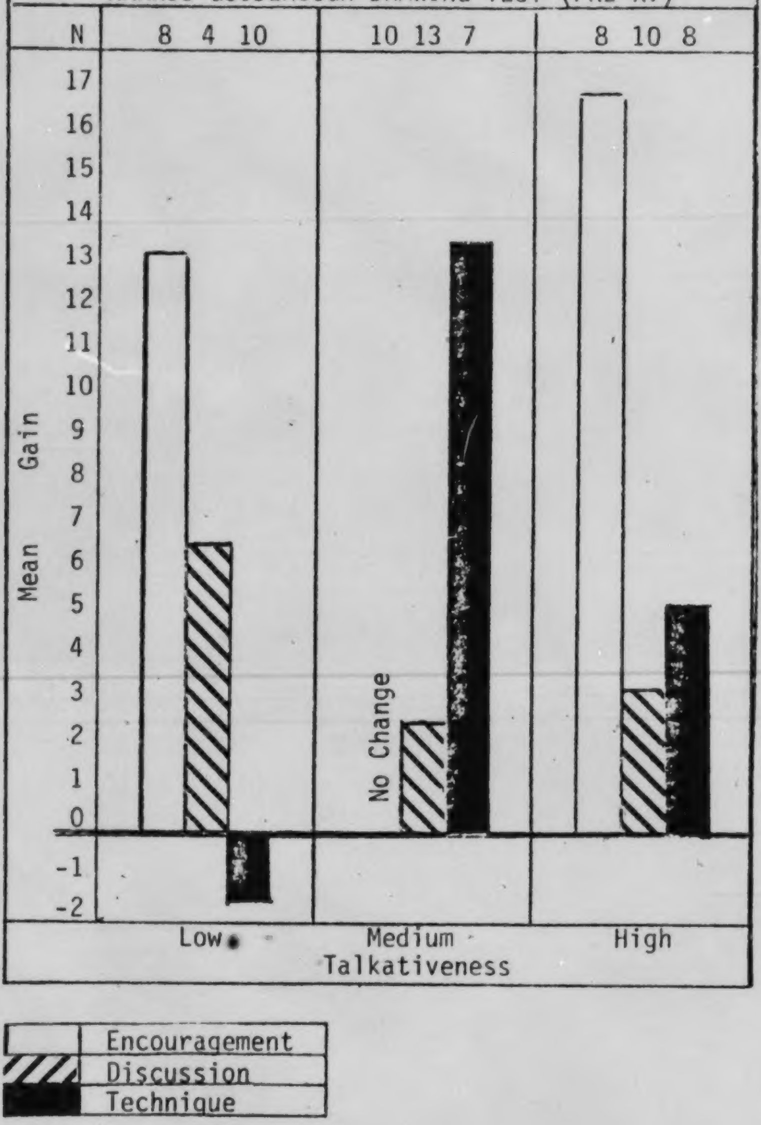


Fig. 30

HARRIS-GOODENOUGH DRAWING TEST (PRE K.)



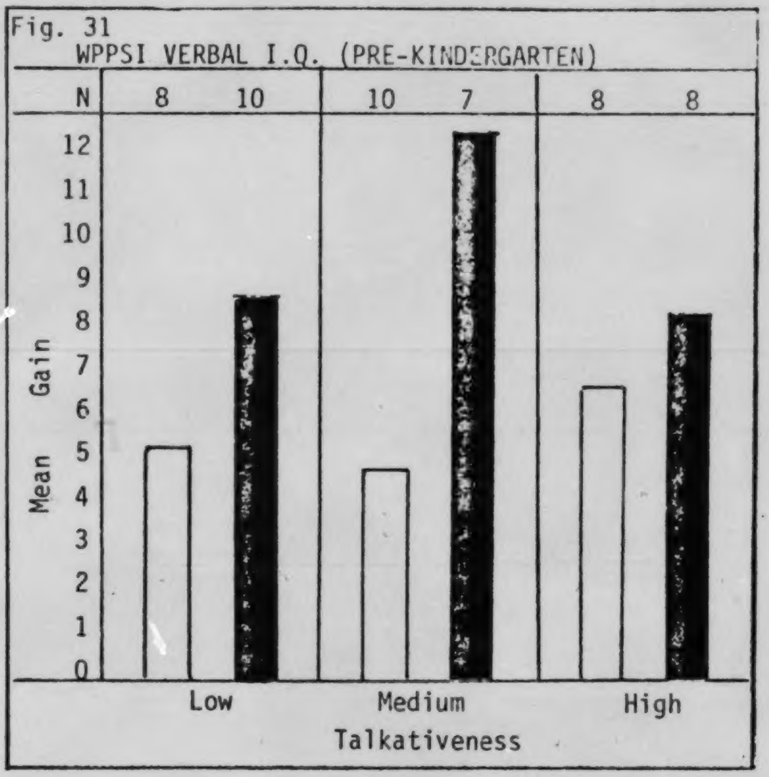


Fig. 31
WPPSI VERBAL I.Q. (PRE-KINDERGARTEN)

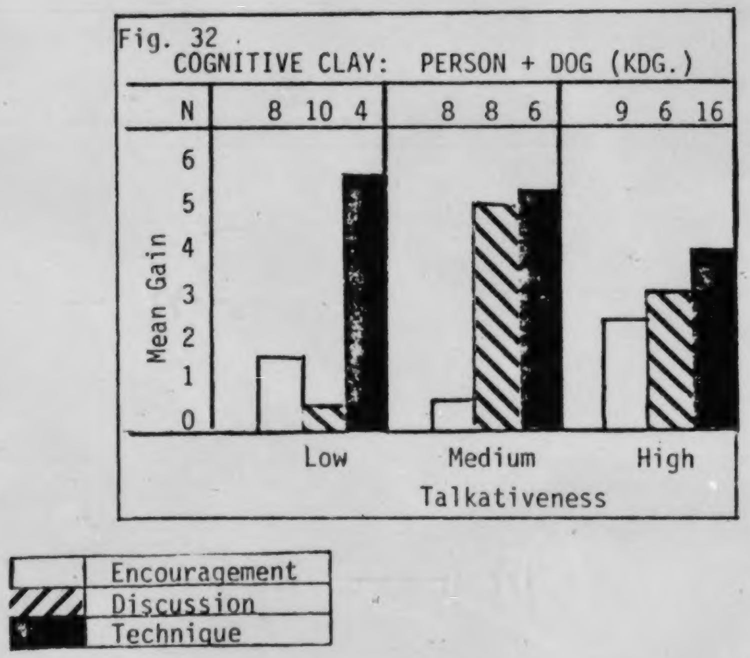


Fig. 32
COGNITIVE CLAY: PERSON + DOG (KDG.)

Fig. 33 CLAY VERBS (KINDERGARTEN)

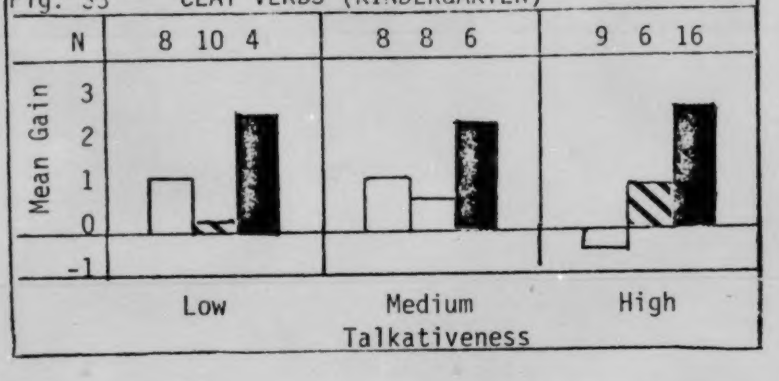
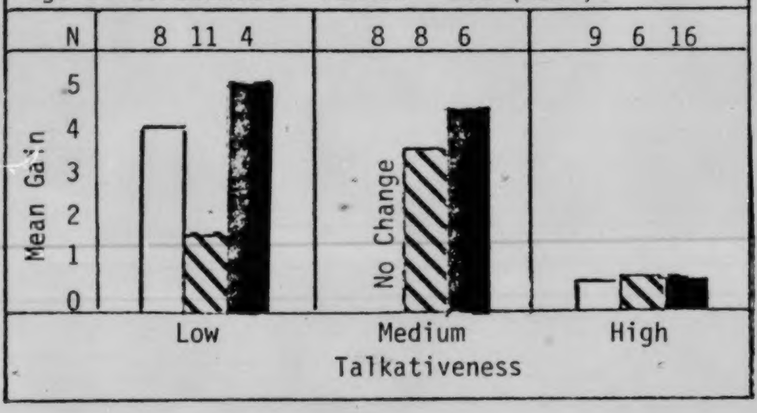


Fig. 34 DUPLICATES: PERSON + DOG (KDG.)



□	Encouragement
▨	Discussion
■	Technique

Fig. 35

HARRIS-GOODENOUGH DRAWING TEST (KINDERGARTEN)

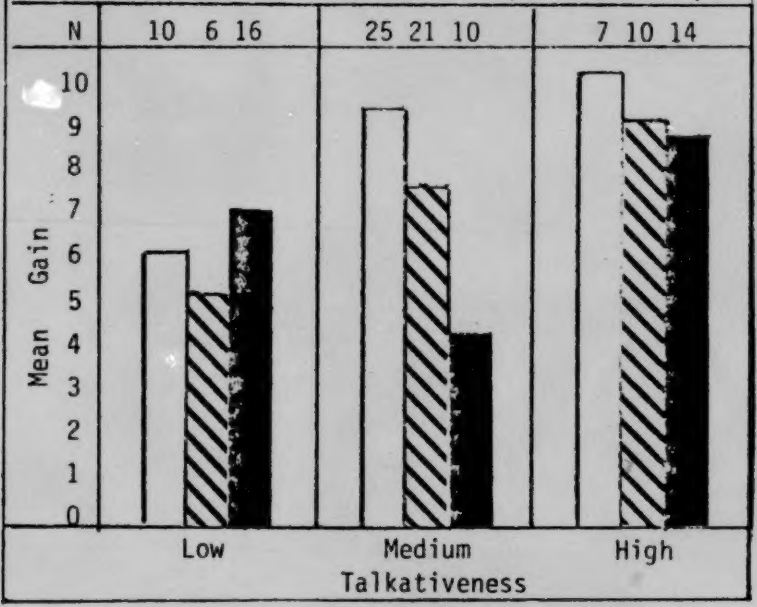
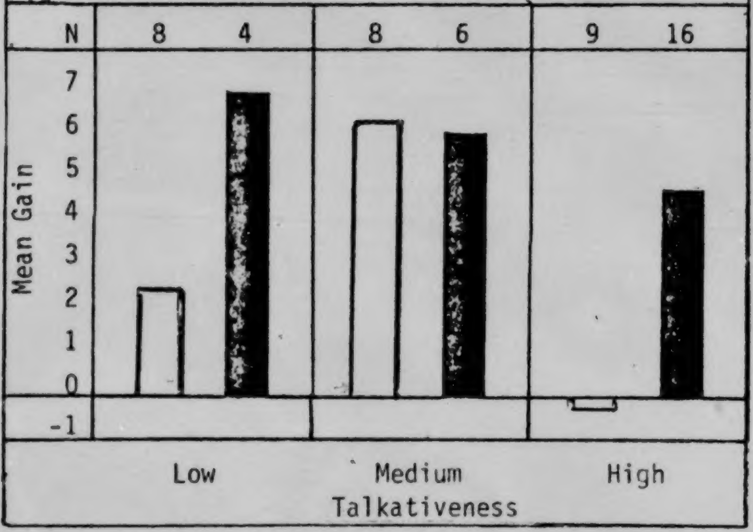


Fig. 36 WPPSI VERBAL I.Q. (KINDERGARTEN)



☐	Encouragement
▨	Discussion
■	Technique

Observations:

- The graphs speak for themselves quite well. In both grades, the low talkative children made the greatest gain in cognitive clay in the Technique Program.
- The Encouragement and Discussion groups were effective in improving scores on the Harris-Goodenough Drawing Test for Pre-kindergarten and Kindergarten low talkative children. The Technique Group did not help low talkative Pre-kindergarten children to transfer their learning to drawing, but did help the Kindergarten children.
- In general, the more talkative Pre-kindergarten children made gains in all programs and Discussion was helpful to these children.
- Technique Group was most helpful to the less talkative Pre-kindergarten children in developing clay and cognitive skills.
- In the Kindergarten, Technique Group was most helpful for most skills for the low talkative children except in transfer to drawing. More talkative children in Kindergarten made significant gains in clay and drawing in the Discussion and Technique programs.
- Technique Group was more successful in developing Verbal I.Q. in high talkative children. Encouragement Group high talkative children made no gains.
- The Kindergarten children in the middle range of talkativeness made the best progress in clay and cognition in the most programs. The least verbal children gained most from the Technique Group. The high talkers gained in all groups in clay and drawing, but made most improvement in the verbal skills with the Technique Program.

Summary Question III.

Intervention in children's clay activities can help children of all levels of classroom adjustment develop clay sculpturing and cognitive capabilities.

The Technique Teaching Program helped children in most groups to develop verbal cognition skills.

Children who have made poor adjustments to the classroom situation need structured experiences and teaching such as they received in the Technique Teaching Program or Discussion Teaching Program to succeed in most of the verbal cognitive tasks. Thus they have help in ordering themselves, the concept, the hands and guidance in checking the shape, their sensory feedback and percept.

All clay teaching programs helped children at each I.Q. level to improve their verbal cognitive skills, but in most tests, the Technique Group made the largest gains.

Children with higher intellectual ability made gains in all groups. Children with low intellectual ability made most gains from the structured experiences and technical instruction of the Technique Program. They improved their Performance I.Q. in the Discussion Program.

Children with lower levels of beginning clay ability and low levels of talkativeness were helped by the Encouragement Program in some cases more than the Technique Program. We may speculate that these children may have had a low self-concept which was improved through the encouragement and acceptance of their efforts. They also may have needed the freedom to explore the medium of clay. The quiet child, lacking in clay-confidence, may have been intimidated or inhibited by the demands of the more structured program.

The more ability a child has the more he benefits from experiences and instruction. There is a level at which the child needs opportunity to explore and manipulate the clay. After that he makes little progress unless he has instruction, until he gains enough skills to be able to learn from any experience, observation, and the sensory feedback he gets in comparing his own product with the real object or his concept.

Older, brighter, well-adjusted children transfer learning from clay to cognitive achievement with any intervention method but make the most progress in the Technique program.

Younger, slower, poorly-adjusted children make progress with the "fullest" intervention program: Technique Program.

F. DISSEMINATION

This project was an experimental study and could not be disseminated as a program until after the results were available. Interest in the project, however, has been generated through staff contacts with principals and teachers in the schools, the Community Communication Council meetings, and professional contacts of the staff in higher education circles.

In-progress articles appeared in newspapers in Columbus, and a radio interview was aired early in the intervention year.

Staff members have made presentations to classes at The Ohio State University, the Columbus Public Schools' Reading Teachers and Elementary Guidance Counselors, community groups interested in preschool education, teacher and community groups interested in desegregation, and The Ohio Association for Christian Schools.

Probably our best means of dissemination has been the enthusiastic teachers who participated in the project and who are continuing to use clay in their classrooms. They pass the word on to other teachers.

Requests for information have come from teachers who were not part of the study.

G. CONCLUSIONS/RECOMMENDATIONS

We conclude that clay activities, as part of a planned curriculum design, can make a valuable contribution to the verbal, cognitive, and artistic development of disadvantaged preschool children.

A child sculpturing in clay, a non-verbal medium, develops cognitive capabilities and develops knowledge of his environment, giving him a feeling of knowing. Whatever he knows, he owns and he expresses it in other media, non-verbal as well as verbal. He also does better on an I.Q. test. We know that I.Q. tests correlate highly with the ability to learn to read and reading achievement. Therefore, we have a medium in clay which is good to use with disadvantaged pre-kindergarten and kindergarten children as it helps develop those same areas that teachers try to develop through verbal media only.

In regard to the selection of a clay teaching program, we can say that:

1. Children in all programs made more improvement than the Control Group in clay and verbal achievement.
2. In the Technique Teaching Program, which intervened in the most systems of child-sculpturing-clay-objects, the children of both age groups and both sexes made the most improvement in all the media.
3. The Discussion Group and Encouragement Group both made significant gains in each media also.
4. Pre-kindergarten children needed intervention in all systems of child-sculpturing-clay-objects in order to make significant gains in cognition represented in each media.

Younger children, who hadhad no experience with clay and/or were evaluated on the pretest as having low sculptural achievement, made the greatest gains in the Encouragement program. There they were free to manipulate the clay and explore its possibilities for as many sessions as they needed to.

The younger children who began the intervention period with more ability in the clay sculpturing, improved most with the technical instruction and with Observation and Discussion methods.

Kindergarten children also profited from other clay teaching programs and made more transfer from clay to other media than pre-kindergarten children.

Kindergarten children made more transfer to subjects not-taught than pre-kindergarten children.

Older, brighter, well-adjusted children transfer learning from clay to cognitive achievement with any intervention method but make the most progress in the Technique program.

Younger, slower, poorly-adjusted children make progress with the "fullest" intervention program: Technique Program.

The older children with lower sculptural ability needed the technical instruction similar to the higher pre-kindergarten children. The older children with higher sculptural ability improved in all teaching programs.

Apparently the more ability a child has, the more he benefits from experiences and instruction. There is a level at which the child needs opportunity to explore and manipulate the clay. After that he makes little progress unless he has instruction, until he gains enough skills to be able to learn from any experience, observation, and the sensory feedback he gets in comparing his own product with the real object or his concept.

Boys of all groups, including the Control Group, made significant gains in clay and transferred improvements to other media.

Girls made no significant gains without intervention, but made significant improvement in cognitive skills in all media when they were taught through clay.

The Technique Teaching Program was the most beneficial to both boys and girls in developing their cognitive skills in all areas.

Conclusions based on subjective observations:

Clay is an inexpensive medium which may be re-used indefinitely with proper care.

Teachers and children can learn how to care for the clay.

They can easily learn a management system for getting the clay out, using it, and cleaning up. Children can develop responsibility in this process.

Teachers can learn to evaluate children's progress in clay.

Teachers helped develop the curriculum for clay. When they understood the theoretical basis of intervening in the non-verbal medium, they could teach for the objectives in the regular curriculum through the medium of clay.

Based on the conclusions from this study, we can make the following general recommendations:

> We believe that clay should be incorporated into the curriculum of the preschool as one of the many media through which the child can develop his verbal and cognitive skills.
>
> If one were to select a clay teaching program for disadvantaged children that would benefit the most children in both sexes in Prekindergarten and Kindergarten, the evidence gathered in this study would indicate that the Technique Teaching Program would be the most productive.
>
> However, if one had limited time and resources for training teachers in technical aspects of clay, the Observation and Discussion Teaching Program, a method more familiar to teachers, would produce improvement in clay and transfer to other media fairly consistently.
>
> If, for some reason, neither of the above teaching programs were feasible, the Encouragement Teaching Program, which provides regular opportunities for children to work with clay with a supportive teacher, would bring about more development than programs without clay activities.

More specifically, we recommend that four-year-old children should have regular sessions of exploration with the clay medium and then the full Technique program, in order to benefit most from the intervention. Five-year-old children make the most progress in the Technique program but also benefit from the other teaching programs.

The decision to include clay in the curriculum in a way that will help children to develop requires a commitment of time for staff development; a commitment of time in the school day for clay sessions; and about fifty pounds of moist earth clay for each classroom. If the teacher does not have access to consultants from this project, she should consult an art teacher or someone in the community who is knowledgeable about clay as to the best way to care for the clay in order to keep it usable. Some suggestions are included in Appendix B of this report.

The experimental intervention project consisted of 32 sessions twice a week for all children in the classroom. Over that 16 weeks we were able to observe children's progress both objectively and subjectively. We do not know the optimum frequency for sessions or the optimum extent of time in a school year to help children gain the potential help they can have from clay intervention. We recommend at least 30-minute sessions on a regular basis. It is important that the teacher and the children feel comfortable and not pressured by time.

The following are a few teaching recommendations based on our experiences in the classrooms during the project:

> Children should have opportunities to explore the clay as a medium, pounding, manipulating, finding out what it will do. However, the children need:
>
> regular times for working with clay;
>
> experience to extend their background of knowledge;
>
> opportunities to attempt to represent their concepts in clay;
>
> further observation and discussion in order to "check out" their perceptions with sensory feedback by comparing again their representations with the real object;
>
> opportunities to find answers to questions raised by the attempt to represent the concept;
>
> the opportunity to try again; and
>
> understanding of the characteristics of clay and techniques for using it effectively.

The teacher should provide opportunities to talk with the children about their products individually or in the group before returning the clay to the container. This verbalization of what the child has done helps him to think about what he has done and will help him to recall at the next session what he did before so that he can build on his previous experience.

Over-emphasis on making a product which is a replica of the real should be avoided. The process is the important factor in the development of the children's capabilities. Accepting the child's attempt and his representation of his perception is important to his trying again, and his product is the teacher's clue as to the next experiences and help which the child needs. More experiences, observations and hints about technique will improve his perceptions and representations more than the teacher's rejecting and "correcting" his product.

After a good time with the clay, lots of conversation and making things, the clay should usually be returned to the air-tight container for use in the next session. Wet towels or sponge in the container with the clay will restore the moisture to make the clay usable the next time. Teachers should not try to keep children's clay products unless they intend to fire them. Once fired, the clay cannot be used again.

Clay experiences seem to be especially helpful for boys. Even the boys in the Control Group made gains in clay. The evidence would suggest that clay centers might be valuable for boys, but in our population the girls did not make gains without intervention. Teachers should keep these findings in mind.

We recommend that some regular sessions with clay should be for all the children if they are to make the best sculptural, verbal, and cognitive gains from the clay activities. Clay could also be provided in centers for children's choice of activity.

Final conclusion:

INTERVENTION WITH CLAY HELPS DEVELOP THE CHILDREN'S VERBAL AND COGNITIVE ABILITY. CLAY IS A GOOD MEDIUM FOR TEACHING.

When we compare the results with the results of the experiment in Israel, we can say with assurance that there is no reason why clay should not be an important medium for all disadvantaged young children across cultures along with all the verbal media that exist in the schools.

H. PHASE-IN

Continuation Efforts.

A survey was made to determine how many teachers were still using clay who used it as members of the project last year. Eighteen responses were tabulated. Of these, fifteen have used clay this year on their own, most using clay once a week. The least time spent with clay was on a monthly basis, with one teacher reporting an irregular use. Eleven teachers used the approach they had been taught although many added additional ideas as well, such as helping children with technical problems. Two reported using clay in centers.

Almost every teacher listed several benefits clay brought to them and their students. Mentioned most frequently was verbalization skills which developed due to clay work. Other benefits mentioned were cognitive growth, muscle development, affective growth, creative development, and one "an outlet for hostility."

Although many teachers found no problems with clay in their classrooms, those who did were mostly concerned with clean-up procedures. Four teachers found problems with clay consistency; six with clean-up, and six had no problems.

Eight teachers had recommended clay to other teachers and gave a number of suggestions to teachers on how to effectively use clay in the classroom. Most frequently mentioned were classroom management (6). Also recommended were understanding clay's potential and enjoying the clay, as well as talking with the custodian ahead of time before a clay lesson!

A few gave some specific teaching suggestions:

"Do it (clay) on a consistent basis--our class reminds us if we do not have time each week." (Pre-k.)

"(Teacher should)
Try it herself;
Feel comfortable in its mechanics;
Understand its potential;
Discuss with other faculty its success."
(Teacher included a request for more clay for next year!)

"Establish definite procedures where children help prepare and clean up. Don't be afraid to be directive.

"Repeat lessons. Children do better and see more everytime you offer it to them. Don't switch subjects, just add to the previous lesson."

"Let children have free expression time with clay before directing the activities."

H. PHASE-IN (Cont.)

Phases to be discontinued:

Testing and experimentation

Equipment Inventory:

None

Equipment:

None required for Phase-In.

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APPENDIX A

Tests Developed for the Project

EXPLANATION AND GUIDE FOR EVALUATION FORM, CLAY PROJECT: PERSON

CLAY TESTS

PROCESS EVALUATION: CHILD'S METHODS OF WORKING WITH CLAY

In this section, a score of + would indicate that the child did do the process described; - would indicate he did not; 0 would indicate that no description of this was available.

CHILD'S FEELINGS ABOUT THE CLAY

1. Enjoyment: If the child seemed to enjoy his time with the clay the tester might indicate such things as verbal comments the child made about the clay in very positive ways; a description of the child's excitement about the clay and his enthusiasm about it, etc. Several positive aspects would result in a score of 7 or 6, then range downward to 2 or 1, which would indicate the child disliked the clay, said he didn't want to work with it, he sat there sullen or exceptionally shy and would not work.

2. Spontaneity: During the work process itself, if the child seemed to work with no difficulty, without asking for advice or help; seemed to know what he wanted to do and how he wanted to do it; did not seem to overplan his figure and stopped working when he felt he had what he wanted, this would indicate a high level of 7 or 6. On the other extreme, if the child constantly asked for help, seemed very unsure of himself, did not seem to know what he wanted to make or seemed very frustrated by the clay itself, then the score would be 1 or 2.

3. Satisfaction: If when the piece was finished the child clearly indicated by his expression or words to the tester that he really liked his piece, that he was pleased with the results and thought he had done very well, then the score would be 7 or 6. If, however, the child seemed very disgusted with his results (even though he may have enjoyed the process of making the piece), then the score would be 1 or 2.

PRODUCT EVALUATION

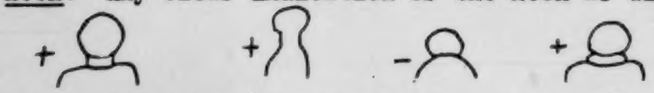
Recognizability: This is to be scored on the basis of 10 photographs of childrens' clay figures. Each photograph is to be compared with the figure being evaluated. By comparing the child's work to one of the photographs, each of which is numbered according to the degree of recognizability, a close approximation of a comparable degree of recognizability can be assigned, and the chosen number should be circled on the form. Thus, if the child's work comes closest to resembling photograph number 6, then number 6 should be circled.

Number of Physical Details: If it can clearly be seen that one of the listed physical details is present in the child's figure, it should be checked off in the + column. If it is uncertain whether a detail is present, but the child has told the tester what the detail is and it is thus labeled so on the drawing form done by the tester, then that detail should be counted. If it is uncertain whether a detail is present and no labeling is present, or if the detail is not present, do not count that detail. The following details may need clarification:

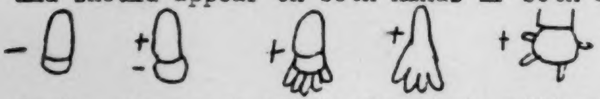
5. eyes: any suggestion of eyes, or one eye if head is sideways.

3. and 4. legs and arms: if only one leg or one arm is present, cross off the s on the form and still score +.

8. neck: any clear indication of the neck as distinct from the head and body.



9. hands: must be clearly represented, apart from arm and fingers. Clay should be a little thicker between the arm and fingers to represent the palm or back of hand, and should appear on both hands if both are shown.

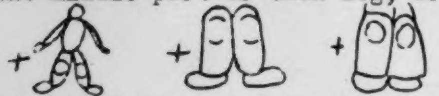


10. feet: any means of showing feet, either from a front view or side.

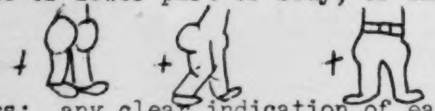
11. fingers: any obvious method of making fingers no matter how many.

12. toes: any method of showing toes, no matter how many.

13. knees: if not labeled, it should be obvious that child made circles of clay in the middle part of each leg, or drew with tool to indicate knee part.

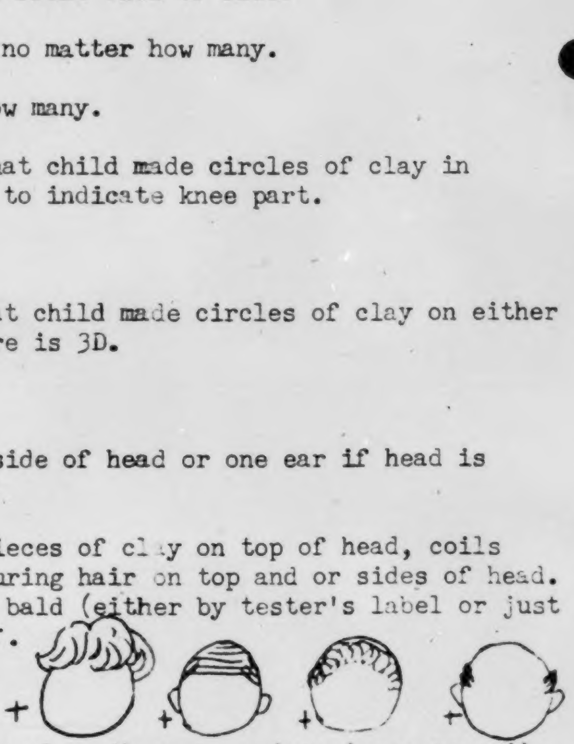


14. hips: If not labeled, it should be obvious that child made circles of clay on either side of lower part of body, or on back if figure is 3D.

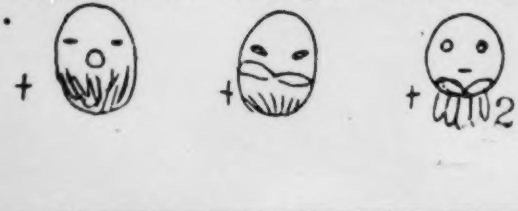


15. ears: any clear indication of ears on either side of head or one ear if head is sideways.

16. hair: any method of showing hair, including pieces of clay on top of head, coils of clay draped around head, or drawing or texturing hair on top and or sides of head. If it is clear child intended to have the head bald (either by tester's label or just a little hair is shown around each ear) score +.

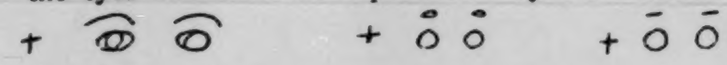


17. beard: any method of showing hair around chin and mouth area; using pieces or coils of clay or texture or drawing. If it looks like whiskers or unshaven lower face, score +.

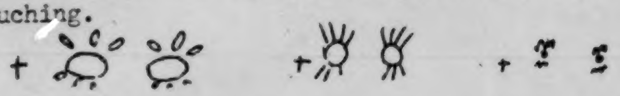


Number of Physical Details, Cont.

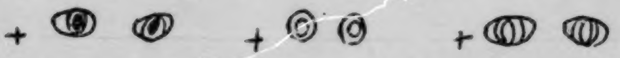
18. eyebrows: any method of showing eyebrows, but must be obviously separate from the eyes and over the top of both eyes if shown.



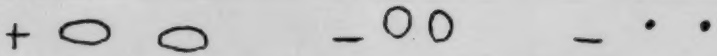
19. eyelashes: any methods of showing eyelashes, but must be obviously separate from the eyes and along the top and or bottom of the eyes, although not necessarily touching.



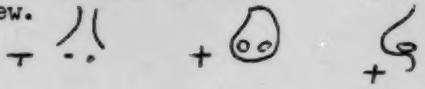
20. pupil of eye: any clear indication of the pupil or iris as distinct from the outline or shape of the eye. Should appear in both eyes if both are shown.



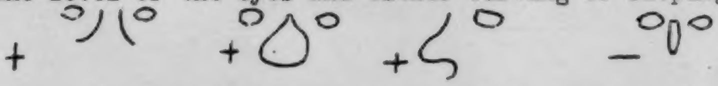
21. shape of eye: if any attempt has been made by child either with the molding of the clay itself or drawing, to give the eye an oval shape rather than just a blob or circle.



22. nostrils: any indication the child tried to make nostrils either at the bottom of a drawn (outlined) nose or shaped nose; count only if there are 2 shown unless side view.

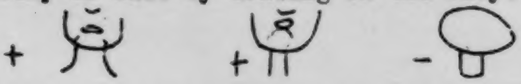


23. shape of nose: if the nose is shown wider at the bottom and either by use of drawing on the clay or shaping the clay the nose is shown as starting just above or at the level of the eyes and either curving or sloping down to the base or tip.

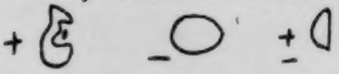


24. lips: any method of showing the mouth has lips, either by coils or drawing on the clay; must show two, both top and bottom lip.

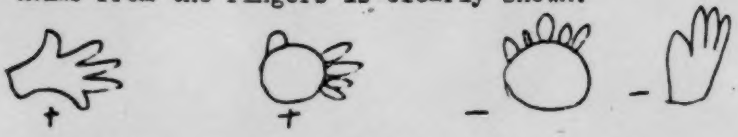
25. chin: should be clear child meant to show chin either by the way he shaped the clay or else by drawing on the clay.



26. shape of ears: if the child tried to show the shape of the ear rather than just a blob, circle or drawn circle, or hole in clay.

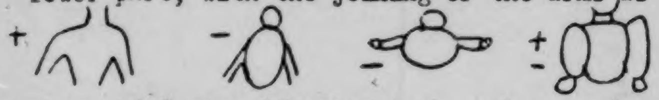


28. shape of hands: if the hand has been shaped as in 9, but the opposition of the thumb from the fingers is clearly shown.

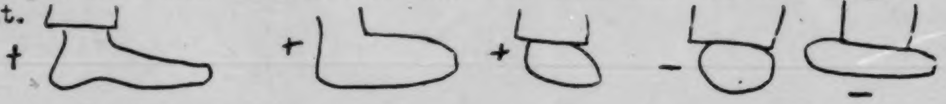


Number of Physical Details, Cont.

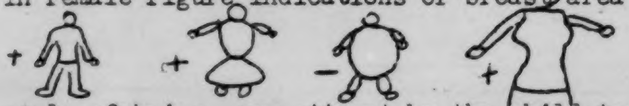
29. shoulders: any clear indication that the child formed shoulders at the top of the body; just rounded corners do not count if the body still has the appearance of a circle or oval. The width of the top of the body should be wider than the lower part, with the joining of the arms as part of the width.



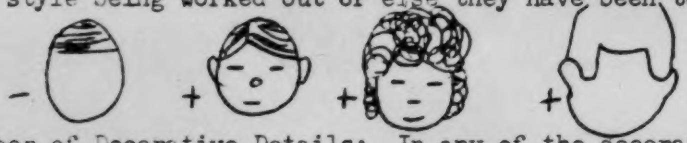
30. shape of feet: if attempts have been made to show the feet with heel and with length greater than its height.



31. shape of body: any clear indication the child tried to show a waist by indenting the clay, tapering the body from more width at top to narrowness near center area. In female figure indications of breast area being wider would count.

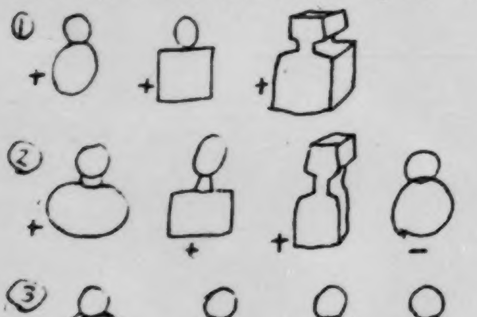


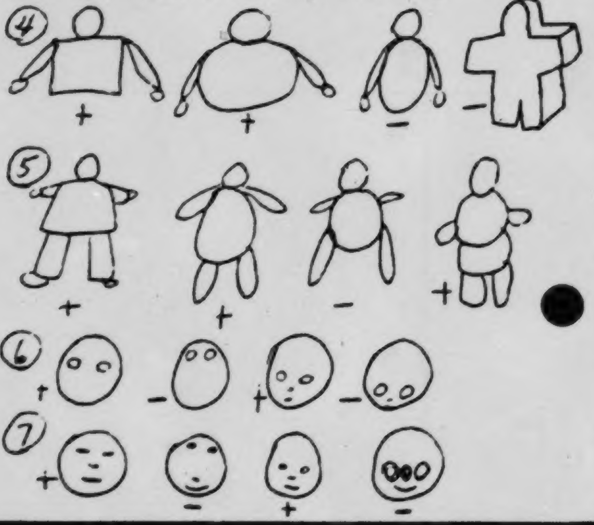
32. style of hair: any attempt by the child to actually give the hair shape by use of side burns, bangs, piled up curls with hair also indicated by ears in some way, or by clearly indicating the hair is parted, combed or brushed by either lines drawn in the clay or by added coils or pieces of clay which are small enough to show the style being worked out or else they have been textured in some way to show hair lines.



Number of Decorative Details: In any of the decorative details, if it is not clear if the detail is present and no label is available, do not count +. In 26. and 27., the purse and umbrella must be held by the figure in same way to count.

Correctly placed Physical Details: For any of these, count + if the detail is clearly placed as described; count ± if the detail is nearly or closely placed as described; count - if the detail is not placed as described. In number 4, for example, the arms cannot be counted as joined correctly if they came out from the middle of the body or if the body and arms have been carved out of one piece with the arms the same thickness as the body. If the child has not indicated shoulders, then it must be clear the arms are joined at the top of either side of the body, not at the neck or head, and only number 3 would be scored +, not number 4.





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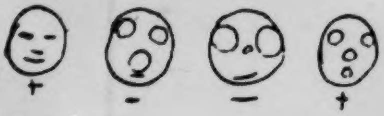

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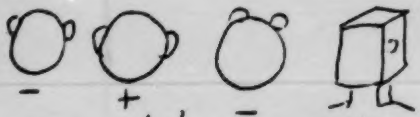

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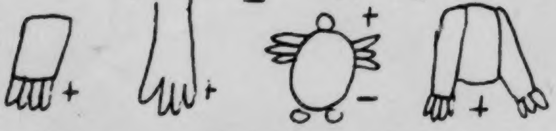

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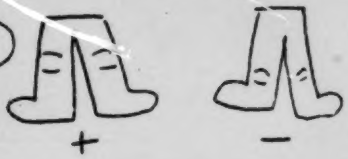

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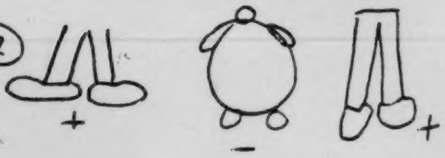


Proportions: Proportions are not always easy to determine, but for the very young child not many have as yet been recognized so scoring in this section may seem to be very low. In the scoring, the ideal proportions of 5 will be achieved by few if any children, and even 4 would have few checks in most cases. 3. indicates what could be considered average in the concept of proportion for this age group in most cases.

1. head to body: Score 5. Body is 3 to 4 times larger than head.
4. Body is 2 to 3 times " " "
3. Body is alightly larger than head.
2. Body is same size as head.
1. Body is smaller than head.
0. Not attempted or part missing.

2. legs to body: Score 5. Legs are slightly longer than body.
4. Legs are same length as body.
3. Legs are about half the size of the body.
2. Legs are less than $\frac{1}{2}$ the size of the body.
1. Legs are less than $\frac{1}{4}$ size of the body.
0. Not attempted or part missing.

3. arms to body: Score 5. Arms are length of figure from top of body to just above the knees.
4. Arms are same length as body.
3. Arms are about half the size of the body.
2. Arms are less than $\frac{1}{2}$ the size of the body.
1. Arms are less than $\frac{1}{4}$ the size of the body.
0. Not attempted or part missing.

4. eyes to head: Score 5. Eyes are 1/8 to 1/9 the size of the whole head.
4. Eyes are between 1/4 and 1/8 " " " "
3. Eyes are between 1/2 and 1/4 " " " "
2. Eyes are between 3/4 and 1/2 " " " "
1. Eyes are either 3/4 or larger than head or smaller than 1/9, as in score of 5.
0. Not attempted or part missing.

5. nose to head: Score 5. Nose is about 1/5 the size of the whole head.
4. Nose is about 1/4 the size of the whole head.
3. Nose is about 1/3 the size of the whole head.
2. Nose is about 1/2 the size of the whole head.
1. Nose is over 1/2 the size of the whole head or smaller than 1/5 as in score of 5.

6. mouth to head: Score 5. Mouth scores same as eyes to head, see #4.

7. hand to arm: Score 5. Hand is 1/3 the size of the arm.
4. Hand is 1/4 the size of the arm.

Proportions, Cont.

7. hand to arm: Score 3. Hand is 1/2 the size of the arm.
2. Hand is 3/4 the size of the arm.
1. Hand is the same size as arm or larger.
0. Not attempted or part missing.

8. fingers to hand: 5. Fingers the same length as hand.
4. Fingers 3/4 the size of the hand.
3. Fingers slightly larger than hand.
2. Fingers 1/2 the size of the hand.
1. Fingers smaller than 1/2 or much larger than hand.
0. Not attempted or part missing.

9. foot to leg: Score 5. Foot is 1/3 the size of the leg.
4. Foot is 1/4 the size of the leg.
3. Foot is 1/2 the size of the leg.
2. Foot is almost as large as leg.
1. Foot is same size as leg or larger.
0. Not attempted or part missing.

10. ears to head: Score the same as hand to arm, #7.

11. neck to head: Score the same as hand to arm, #7.

12. toes to feet: Score 5. Toes are between 1/4 and 1/3 the size of the feet.
4. Toes are between 1/2 and 1/4 the size of the feet.
3. Toes are between 1/8 and 1/4 the size of the feet.
2. Toes are almost the same size as feet.
1. Toes are larger than the foot or smaller than 1/8 of the foot.
0. Not attempted or part missing.

3D Concepts: In scoring 3D concepts, try to determine if the part named is clearly interpreted by the child in a 3D manner: that is, the part is not flattened out in a cookie manner or simply outlined with strips of clay. Even if the figure is not standing, parts of that figure can be conceived by the child in 3D ways; for example, the head is often a round ball even if the rest of the figure is flattened out out outlined; in this case, the head would score +. If the head in this case were rounded but it is not completly clear if it was left round or somewhat flattened on the face and back of the head; or if there is any doubt as ~~to~~ whether it could be either 3D or 2D, score ±. If it is clear than the child did flatten out the clay or use clay to outline, then score _.

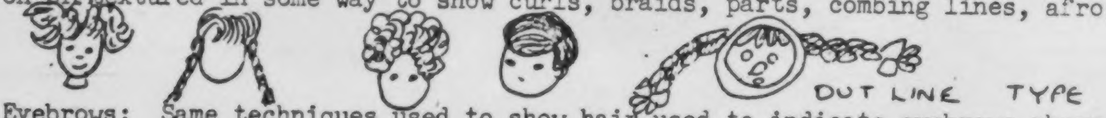
TECHNIQUE EVALUATION:

Textures: The child's use of textures involves any attempt made to show how a surface or material might feel or look; it reveals the child's understanding that different types or kinds of materials are made of various kinds of substances each of which has its own characteristics. To show this, the higher level child may attempt to draw in the clay, press objects (stamp) the clay, add bits and pieces of clay or various combinations of these. In order to score accurately, it must be clear that the texturing attempts were deliberate, not accidental.

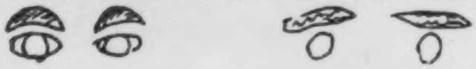
Textures, Cont.

Score 2: This is the highest level, and with each area (hair, eyebrows, etc.), would indicate that the child added bits or pieces of clay to the section and then used tool, objects, fingernails, etc., to show texture; or, if the clay figure has been pulled out of one lump of clay with no clay added, it should be clear that the clay was actually shaped or molded into the section to be score before texturing was continued by the process described above. Examples in each section of a score of 2 would be:

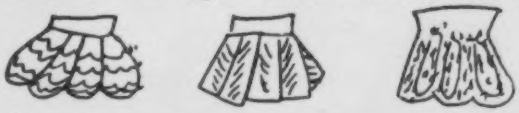
1. Hair: Pieces or bits of clay are added to or pulled out of the head and then drawn on or textured in some way to show curls, braids, parts, combing lines, afro, etc.



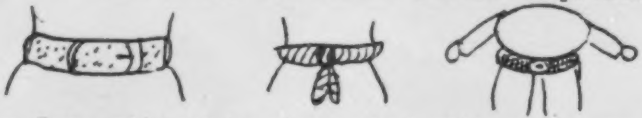
2. Eyebrows: Same techniques used to show hair used to indicate eyebrows above each eye; typical example would be use of a narrow coil which is added above each eye and then textured to show hair lines.



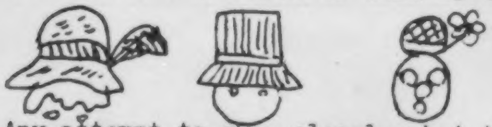
3. Skirt or bottom of dress: Clay is added or shaped to show folds and then texture is is used to indicate the type of material of designs which are part of the material itself.



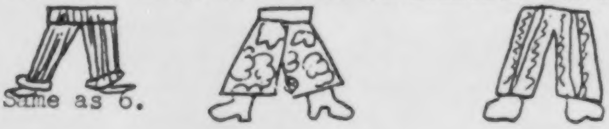
4. Belt: Clay clearly has been shaped or added around the waist area to resemble a type of belt and then some method of showing what the belt is made of or designs on the belt have been indicated; the buckle should be present or some method of fastening the belt.



5. Hat: Any clear attempt to show a hat sitting on top of the head or being held in the person's hand, plus attempts to show what the hat is made out of and/or what some of the parts of the hat are made of such as texture of the hatband, the feathers, flowers, etc.

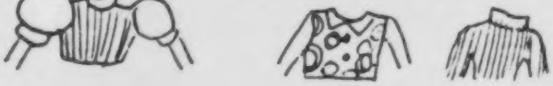


6. Pants: Any attempt to show clearly what the pants are made out of and should indicate the clay has been shaped or added to indicate the material of the pants, then textured.



7. Jacket: Same as 6.

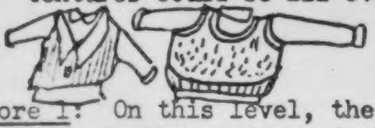
8. Top of dress or blouse: Same as 6; should include some neckline, either a collar or edge around the neck clearly shown; if sleeveless, edges should look finished.



9. Beard: Same as 1.

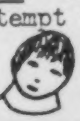
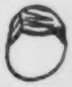
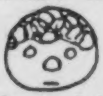
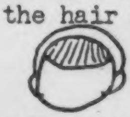
10. Shirt: Same as 8.

11. Vest: Should be obviously separately textured from the shirt or blouse beneath and may show some method of fastening and have labels or a finished looking edge; textures could be all over type patterns or lines of any deliberate nature.

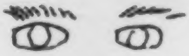
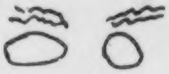


Score 1: On this level, the child does show texture, but he does so by drawing the textures on the surface of the clay with no attempt to build up the shape first; also, the textures are usually less detailed and sophisticated.

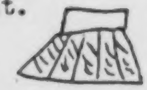
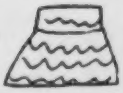
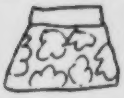
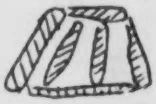
1. Hair: Hair is drawn onto the surface of the head; must be clearly a deliberate attempt to show the texture of the hair by indicating combing line, curls, bangs, etc.

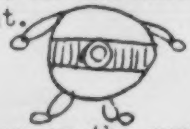
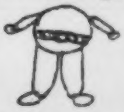
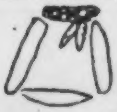
2. Eyebrows: Must be indicated by more than a single line drawn above each eye to count as texture; must clearly indicate above each eye wavy, curly or straight lines in each eyebrow.

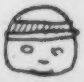
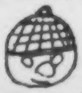
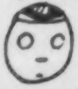
3. Skirt or bottom of dress: Lines of some kind are clearly indicated to show folds in the materials or else designs and/or kind of material are clearly indicated; just showing one large flower in the center of the skirt area would not count; an all-over pattern or design would count.

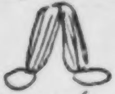
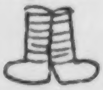
4. Belt: Clear indications of a belt drawn around the waist area with some method used to show materials in the belt or designs on the belt; buckle or some method of fastening should be present.

5. Hat: May be drawn on the surface of the head itself but should have obvious sections of a hat such as hatband, flowers, feathers, etc.

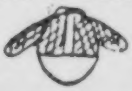
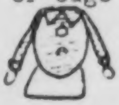




6. Pants: Any attempt clearly made to show by drawing or stamping clay that the pants have a type of material or design (all-over kind), but done directly on the leg itself with no attempt to show shape of the pants first.

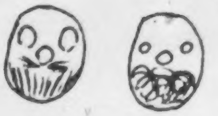
7. Jacket: Same as 6.

8. Top of dress or blouse: Same as 6; drawn right on top of body with no attempt to show a shape first; should include some neckline, either a collar or edge drawn around the neck; if sleeveless, edges should look finished.

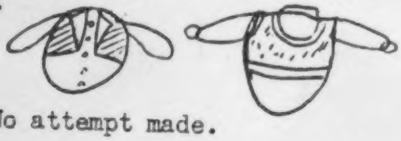
Textures, Cont. - Score 1

9. Beard: Same as 1.



10. Shirt: Same as 8.

11. Vest: Should be obviously drawn on the body separately from the blouse or shirt underneath and show some method of fastening, with either lapels or a finished looking neck edge; textures could be all over type patterns or lines of a deliberate nature.



Score 0: No attempt made.

Connection of Parts: This section attempts to analyze what the child did with physical and decorative parts as far as methods used to include them in the figure. It is not expected that many preK and K children would score in the higher range of 4 through 7 until after intervention.

Score
1: Not connected
2: Just touching
3: Overlapping connections; part is just laid at the end over the next.
4: Part smoothed onto figure; clay has been deliberately blended to create a continuous appearance in the clay figure.
5: Was not connected because entire figure was shaped out of one piece with the exception of the head.
6: Was not connected because entire figure was shaped out of one piece except for decorative details.
7: Was not connected because entire figure was shaped out of one piece.

Methods of Working with Entire Figure: In this section, simply checking off the characteristics of the three-dimensional aspects of the entire clay piece is all that is necessary. In number 8, "Figure is almost standing," if the child resorted to any type of prop to get the figure to stand or if he had to make the figure sit because he couldn't get it to stand this would be checked here. However, if the child deliberately intended to make his figure in a position other than standing and the figure is completely shown in a full, 3D manner, it should be counted in number 9, with the exception of lying down figures, scored in 6. In number 7, if the child managed to prop or angle the figure so that it is upright from the waist up or the knees up and it is not sitting (see number 8 , it is counted here. Outlining with the clay might involve using coils of clay to simply show the outline of the figure, or small pieces of clay might be used to make a sort of narrow wall effect to do the same thing.

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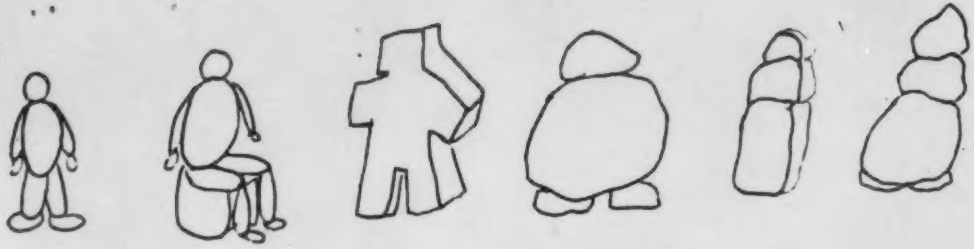

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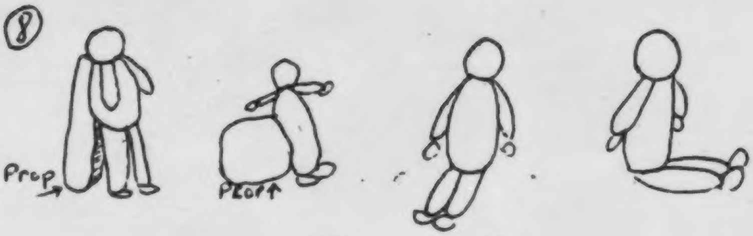
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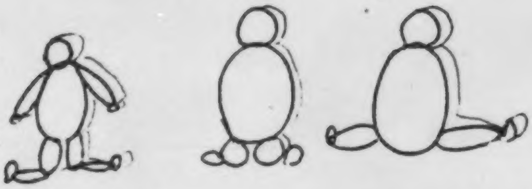

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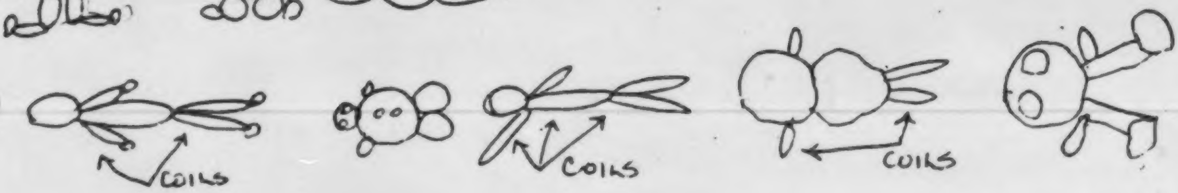
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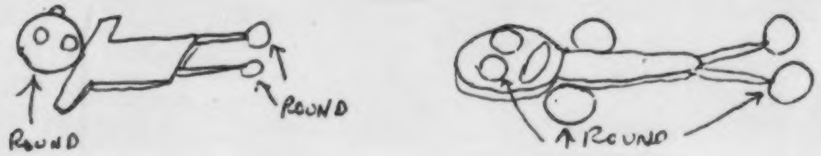
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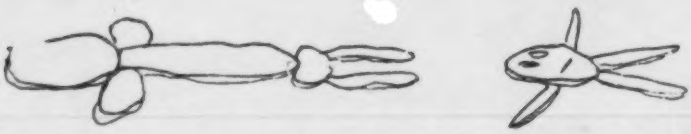

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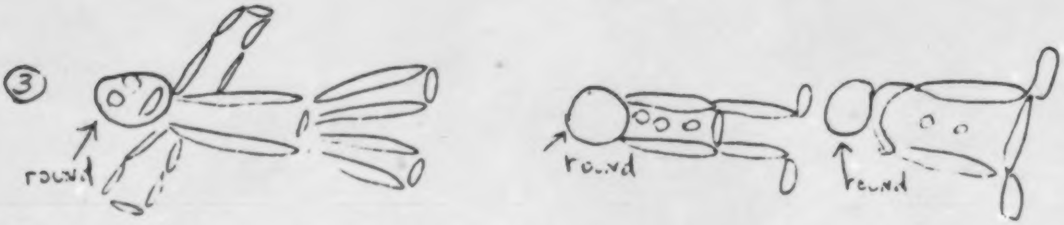
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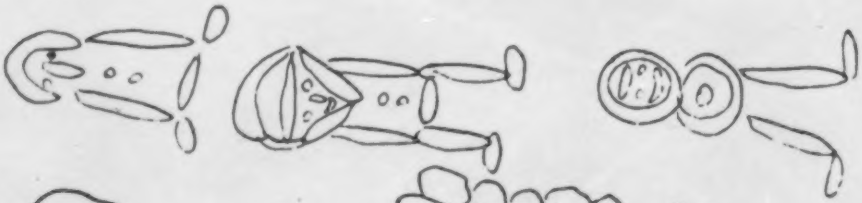

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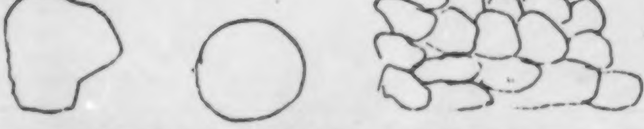


EXPLANATION AND GUIDE FOR USING EVALUATION FORM, CLAY PROJECT: DOG

PROCESS EVALUATION:

This section should be scored by the person who is observing the child working in clay; it can be checked off as the child works or done immediately afterwards if the observer would prefer. This does not replace any descriptive notes that might need to be written as the child works.

+	The child did do the process described.
-	The child did not do the process described.
0	Unobserved or unrecorded information.

CHILD'S FEELING ABOUT THE CLAY

1. Enjoyment: If the child seemed to enjoy his time with the clay the tester might indicate such things as verbal comments the child made about the clay in very positive ways; a description of the child's excitement about the clay and his enthusiasm about it, etc. Several positive aspects would result in a score of 7 or 6, then range downward to 2 or 1, which would indicate the child disliked the clay, said he didn't want to work with it, he sat there sullen or exceptionally shy and would not work.

2. Spontaneity: During the work process itself, if the child seemed to work with no difficulty, without asking for advice or help; seemed to know what he wanted to do and how he wanted to do it; did not seem to overplan his figure and stopped working when he felt he had what he wanted, this would indicate a high level of 7 or 6. On the other extreme, if the child constantly asked for help, seemed very unsure of himself, did not seem to know what he wanted to make or seemed very frustrated by the clay itself, then the score would be 1 or 2.

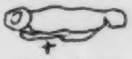
3. Satisfaction: If when the piece was finished the child clearly indicated by his expression or words to the tester that he really liked his piece, that he was pleased with the results and thought he had done very well, then the score would be 7 or 6. If, however, the child seemed very disgusted with his results (even though he may have enjoyed the process of making the piece), then the score would be 1 or 2.

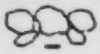
PRODUCT EVALUATION

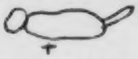
Recognizability: This is to be scored on the basis of 10 photographs of childrens' clay dogs. Each photograph is to be compared with the dog being evaluated. By comparing the child's work to one of the photographs, each of which is numbered according to the degree of recognizability, a close approximation of a comparable degree of recognizability can be assigned, and the chosen number should be circled on the form. Thus, if the child's work comes closest to resembling photograph number 6, then number 6 should be circled.

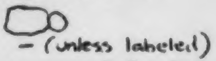
Number of Physical Details: If it can clearly be seen that one of the listed physical details is present in the child's dog, it should be checked off in the + column. If it is uncertain whether a detail is present, but the child has told the tester what the detail is and it is thus labeled so on the drawing form done by the tester, then that detail should be counted. If it is uncertain whether a detail is present and no labeling is present, or if the detail is not present, do not count that detail. The following details may need clarification:

1. head: any clear indication of a head as separately handled from the body; that is, it should be clear that the child intended to make a head, not just another section of the body itself.

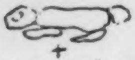


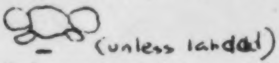


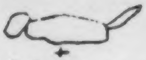


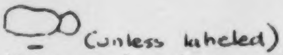


2. body: any clear indication of a body as separately handled from the head; that is, it should be clear that the child intended to make a body, not just another section of the head.

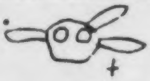


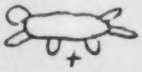


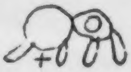


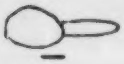


3. legs: any number of legs may be counted here as +; they need not come from the body to be counted.

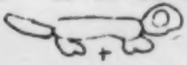


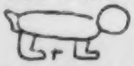


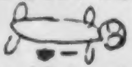


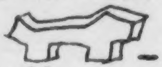


4. feet (paws): any clear indication the child tried to make feet, usually by adding or shaping clay at the ends of the legs, but can be counted as + if it is clear the child made feet but did not make legs.

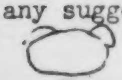


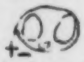


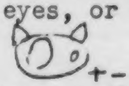


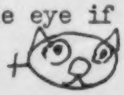


5. eyes: any suggestion of eyes, or one eye if head is sideways.

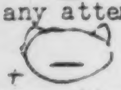


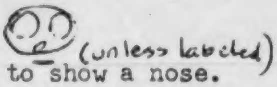


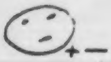


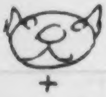


6. mouth: any attempt to show a mouth.

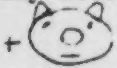


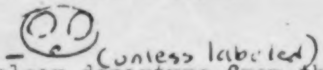


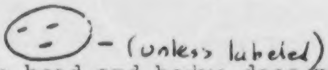


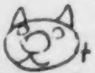


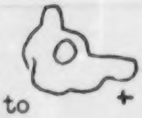
7. nose: any attempt to show a nose.



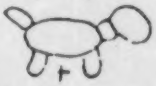


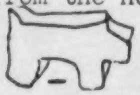


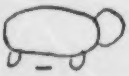


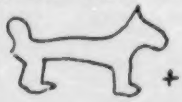


8. neck: must be a clear departure from the head and body; does not need to be shaped.

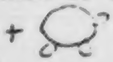


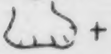


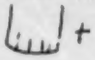




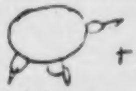
9. toes: any method of showing toes, no matter how many.

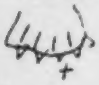


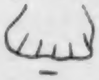


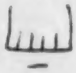


10. toenails (claws): any clear method of indicating toenails at the end of the feet or legs.

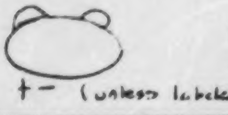


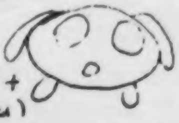


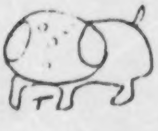


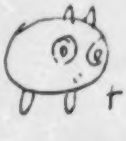


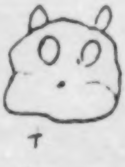
11. ears: any attempt to show ears; may be counted even if not on head if clearly meant to be ears.



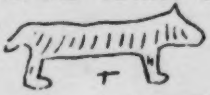


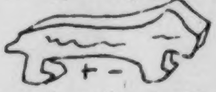


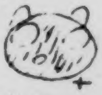




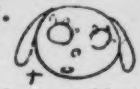
12. hair (fur): any suggestion of hair or fur either on head, body, tail or legs using any methods.

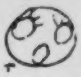


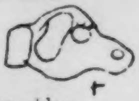




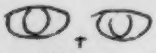
13. eyelashes: any suggestion of eyelashes, but must be clearly indicated as separate from the eyes and along the top and/or bottom of the eyes, although not necessarily touching.

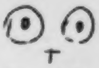


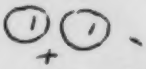




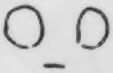
14. pupil of eye: any clear indication of the pupil or iris as distinct from the outline or shape of the eye. Should appear in both eyes if both are shown.

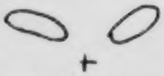


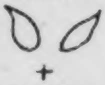




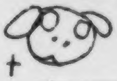
15. shape of the eye: if any attempt has been made either with the molding of the clay itself or drawing, to give the eye an oval shape rather than just a blob or circle.

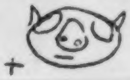


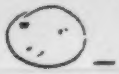




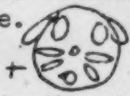
16. nostrils: any indication the child tried to make nostrils; if no other nose suggestion is present, do not count unless it is obvious the child intended nostrils rather than some other physical or decorative detail.

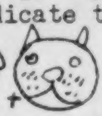


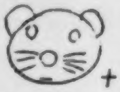




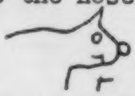
17. whiskers: any attempt to show whiskers on the face of the dog; may also count + if the child made the little holes to indicate the placement of the whiskers around the face.

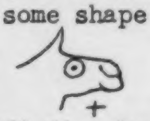


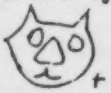


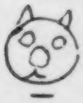


18. shape of nose: there are many possibilities here due to the wide variety in shapes of dogs' noses, but do not count + here unless it is very clear the child intended to give the nose some shape either by drawing on or shaping the clay.

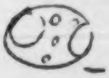


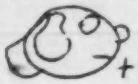


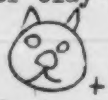


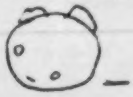


19. shape of ears: if the child tried to give the ears a definite shape rather than just making circles or blobs of clay on either side of the head.





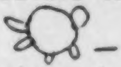


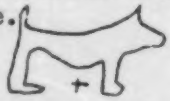


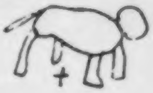
20. correct number of feet: must show clearly four feet.

21. correct number of legs: must show clearly four legs.

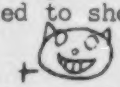
22. shape of body: any clear indication the child tried to give the dog's body a shape rather than a circle or blob. Again, with the wide variety of dogs, many possibilities exist here.

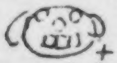


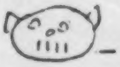




23. teeth: any clear indication the child tried to show teeth.

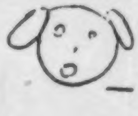


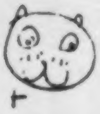


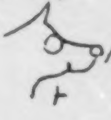


(unless labeled)

24. shape of mouth: must clearly show the jaw line below and indicate in some way how the mouth is related to the nose.

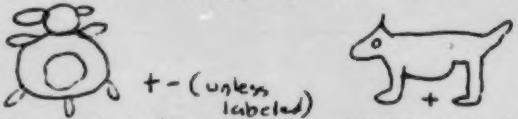






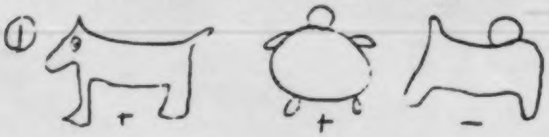
25. tongue: any clear indication the child tried to show a tongue.

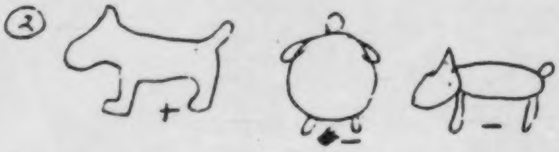
26. stomach: if the child clearly tried to indicate the stomach area as a well-defined detail, rather than having the same look at the top of the body as on the bottom in the 3-dimensional dog, for example; or by drawing on or shaping the clay in a 2-dimensional dog.

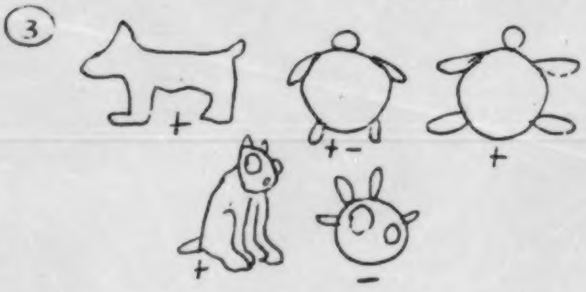


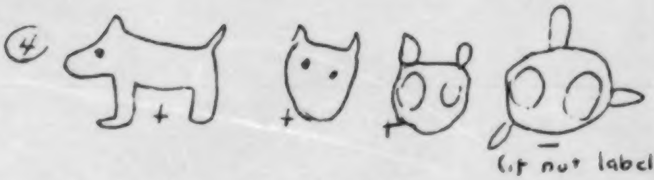
Number of Decorative Details: In any of the decorative details, if it is not clear if the detail is present and no label is present, do not count +. In order to count the collar, leash (chain), coat, bone, or buttons, they must be attached to the dog in some way: i.e., the collar around the dog's neck, the leash attached to the collar or even to the neck if no collar was attempted.

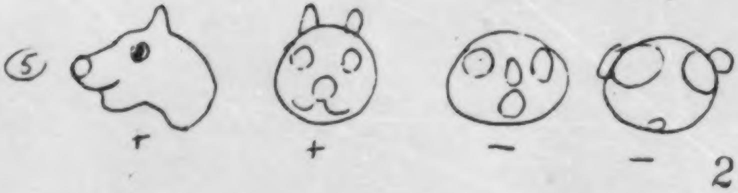
Correctly Placed Physical Details: For any of these, count + if the detail is clearly placed as described; count ± if the detail is nearly or closely placed as described; count - if the detail is not placed as described or is missing.

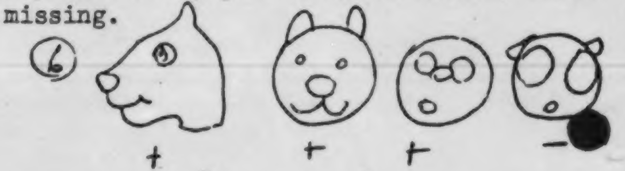


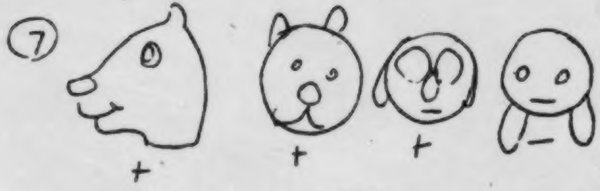


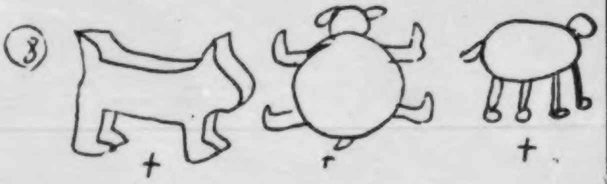


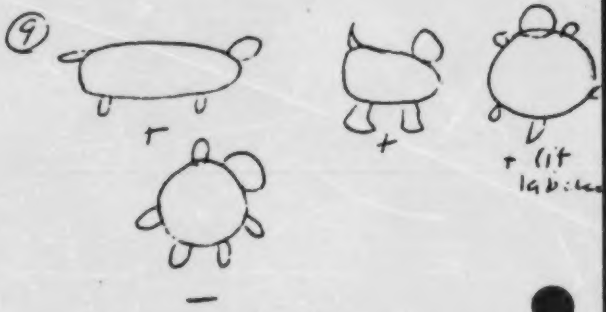












ADULT DRAWING AND CHECKLIST

CORRECT INFORMATION BELOW:

PRE-INTERVENTION POST-INTERVENTION

Name of Child ____________________

Computer Number ____________________

Sex: M____ F____

Ethnic Group: 1 2 3 4 5

School ____________________ Number ( )

School Cluster Number __________

Teacher ____________________ Number ( )

Evaluator ____________________ Number ( )

Intervention Group:
1. Control
2. Enrichment A
3. Enrichment B
4. Discussion
5. Technique

Date of Test ____________________ Yr. Mo. Da.

Date of Birth ____________________ Yr. Mo. Da.

Age: Years________ Months ________

Total Months ________

Grade: Pre-Kindergarten Kindergarten

CLAY FREE ________

CLAY PERSON ________

CLAY DOG ________

Upright (vertical) Figure ________

Lying Down (horizontal) Figure ________

MEASUREMENTS ______________

ENUMERATION OF DETAILS (tell how many of each ex.: 2 eyes)

*Drawing on other side.

*PLEASE LABEL ALL DETAILS

(Please circle correct information in all
sections of this form requiring selection
of one answer from several possibilities.)

PRE-INTERVENTION   POST-INTERVENTION

FREE   PERSON   [✓ DOG]

CLAY

Name of Child ____________________

Computer Number ____________________

Sex: M___ F___

Ethnic Group: 1 2 3 4 5

School ____________________ Number (   )

School Cluster Number ______________

Teacher ____________________ Number (   )

Evaluator ____________________ Number (   )

Intervention Group:
1. Control
2. Enrichment A
3. Enrichment B
4. Discussion
5. Technique

Date of Test ____________________
Yr. Mo. Da.

Date of Birth ____________________
Yr. Mo. Da.

Age: Years_______ Months ______

Total Months________

Grade: Pre-Kindergarten   Kindergarten

Time: Begin _________ End ______ = TOTAL _______

PART I

PROCESS EVALUATION: CHILD'S METHODS OF WORKING WITH CLAY

A. In this section, a sequential record of the process used by the child as he engages with the clay is to be written by the evaluator. (Include any interactions with testor).

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

R = Related to clay
NR = Not related to cla

B (1) Verbal Activities of the Child: Please check appropriate boxes.

	+		0
	R	NR	
4. Talked almost the entire time while working with clay without the evaluator talking to him.			
3. Talked a lot on his own while working with clay but worked quietly part of the time.			
2. Talked only when spoken to by evaluator and very little on his own while working with clay.			
1. Did not talk at all even when evaluator asked questions (child might have used body movements such as shaking head instead of words.)			
B (2) Talked or sang to the clay while working.			

Please check appropriate box that most closely fits the child's method of working with the clay.

WHOLE/WHOLE:

	+	0
1 Left clay as lump; did not form into any shape.		
2 Left clay as lump; named it.		
3 Left clay as lump but pounded into shape and named it.		
4 Left clay as lump but pounded into shape and did not name it.		

PARTS/WHOLE:

5 Pulled or pinched off pieces from lump of clay and connected them together as he worked.		
6 Pulled or pinched off pieces from lump of clay, left all or most parts separate until end, then connected them together.		
7 Cut off pieces (using clay tools), then connected them back together.		

WHOLE/PARTS:

8 (Left clay as lump and put part(s)(poked or punched or drew) on lump.		
9 Pulled or pinched all parts out from whole (did not separate parts from initial lump).		
10 Pulled or pinched parts out as in (9) except for one or two additional separate parts added.		
11 Carved with tools from one piece of clay (did not separate parts from initial piece).		

PARTS/PARTS:

12 Pulled off pieces, rounded or shaped these, but never connected them.		
13 Pulled off pieces, no rounding or shaping, no connecting.		
14 Cut off pieces with clay tool but never connected them.		

D Methods of Connecting Parts: Please check appropriate box(es) that describe most connections of parts. (Check more than one if equally used.)

1 Did not make parts or he drew, punched, or poked parts.	
2 Not connected to each other.	
3 Just touching each other.	
4 Combination of just touching and overlapping each other.	
5 Overlapping each other; parts are laid at the ends over or under other parts.	
6 Parts are connected together by some kind of pinching.	
7 Parts are smoothed together; clay has been deliberately blended to create a continuous appearance in the clay figure or shape.	

E. Process Patterns: Circle a pattern if it seems to apply to this child's way of working with clay in this particular task.

I Parts to Whole
1) pulled off pieces of clay from lump then connected them back together.
2) parts left either just touching or overlapping.
3) did not overwork clay.

II Parts to Whole
1) pulled off pieces, rounded or shaped these, but never connected them.
2) parts left unconnected.
3) did not overwork clay.

III Parts to Whole
1) pulled off pieces of clay from lump, then connected them back together.
2) tried to smooth connections
3) did not overwork clay.

IV Parts to Whole
1) pulled off pieces and left them separate until end.
2) tried to connect parts by pinching them together.
3) overworked clay.

V Whole to Parts
1) pulled all parts out from whole (did not separate parts from initial piece).
2) parts not connected because entire figure or shape(s) was formed out of one piece.
3) did not overwork clay.

VI Whole to Parts
1) pulled parts out from whole except for several details.
2) those parts added were pinched onto original clay lump.
3) did not overwork clay.

VII Other (Describe Them)

Child's Feelings About The Clay: Check number for each item which best suits child's feelings about clay. Do not score until child is finished with clay because child's feelings may change during proces

High	7	6	5	4	3	2	1	Low
1. Enjoyment: Child seemed to enjoy working with clay during process; he was confident, relaxed, able to concentrate, involved with the act of creating.								
2. Spontaneity: Child worked easily and with confidence during process; child did not appear to be trying to please the adult or simply fulfill an assignment; he became involved in the process of clay to the extent that he was able to let his own feelings and ideas evolve in a free and open manner.								
3. Satisfaction: Child seemed to be satisfied with his piece at conclusion of process; he expressed his satisfaction by his verbal or facial expressions.								

PART II

ODUCT EVALUATION

A. Recognizability:

Compare this product with the photographs in the recognizability scale. Decide which of the ten categories most nearly resembles the product; circle number.

Low 1 2 3 4 5 6 7 8 9 10 High

B. Physical Details:

After child finishes his product, look at it and attempt to identify as many details as possible; give these a plus. If some details are not clear enough for you to identify, ask the child what the detail is by pointing to it and asking "What is this?" In the appropriate box next to the detail that you asked the child about, indicate that you did ask him the question, and score the detail a plus if he identified it; a 0 if he did not, or if he says the detail is "nothing." Don't ask the child to describe or tell you about his product in a general way.

	tester asked child	+	0		tester asked child	+	0
1. head/body comb.				31. hands			
2. head				32. fingers			
3. body				33. elbows			
4. eyes				34. shape of eye			
5. mouth				35. shape of nose			
6. lips				36. shape of ears			
7. nose				37. shape of hands (paws)			
8. chin				38. shape of body			
9. ears				39. shape of feet			
10. hair				40. shape of mouth			
11. neck				41. style of hair			
12. eyebrows				42. correct number of fingers			
13. eyelashes				43. correct number of legs			
14. eyelids				44. correct number of feet			
15. pupil of eye				45. mustache or whiskers			
16. nostrils				46. beard			
17. teeth				47. penis (child's word sub.)			
18. tongue				48. belly button			
19. shoulders				49. tail			
20. stomach				50.			
21. waist				51.			
22. hips				52.			
23. legs				53.			
24. feet				54.			
25. ankles				55.			
26. toes				56.			
27. toenails				57.			
28. knees				58.			
29. arms				59			
30. wrist				60.			

TOTAL ________

C. Number of Decorative Details (See instructions for physical details).

	asked	+	0		asked	+	0
1. collar				9.			
2. leash				10.			
3. chain				11.			
4. bone (attached)				12.			
5. toy (attached)				13.			
6.				14.			
7.				15.			
8.				16.			

TOTAL ________

D. Number of Background Details (See instructions for physical details).

	asked	+	0		asked	+	0
1. dog house				9.			
2. bone				10.			
3. bowl or dish				11.			
4. fence				12.			
5. bed				13.			
6. blanket				14.			
7. rug				15.			
8. toy				16.			

TOTAL ________

Total of number of physical details ________
Total of number of decorative details ________
Total of number of background details ________

TOTAL ______

E. Correctly Placed Physical Details: Please mark each of the following according to your judgment: + (plus) means the detail is placed correctly; 0 (zero) means the detail is not placed correctly or is missing.

	+	0
1. head on top front end of body		
2. head on top of neck		
3. eyes placed on head		
4. nose between eyes and mouth		
5. mouth below nose		
6. ears on sides or top of head		
7. legs joined to body beneath or at lower sides		
8. feet or paws at ends of legs		
9. toes or claws at ends of feet.		
10. tail at back of body		

TOTAL ______

Proportions:

Before filling out the boxes below, indicate on a scale of 1-10 how in your judgment this child understood proportions of a dog, or how well he was able to relate the various parts of a dog as regards size to each other.

Low 1 2 3 4 5 6 7 8 9 10 High

Check the number in each section which corresponds most with the product being evaluated.

Body to head

4. Body is larger than head.	
3. Body and head are the same size.	
2. Body is smaller than head.	
1. Not attempted or part missing.	

Eye(s) to head

4. Eye(s) 1/4 size of head or smaller.	
3. Eye(s) between 1/4 and 1/2 size of head.	
2. Eye(s) 1/2 size of head or larger.	
1. Not attempted or part missing.	

TOTAL ___________

G. **Whole Figure or Shape:**

Check the description which best describes the product being evaluated.

7. Figure of shape is upright (vertical) unsupported by props, etc.	
6. Figure or shape is upright (vertical) but has some support.	
5. Part of figure or shape is upright (vertical) and part is lying down (horizontal).	
4. Figure or shape is lying down (horizontal).	
3. Clay is upright (vertical) but was not organized into a figure or shape.	
2. Clay is lying down (horizontal) but was not organized into a figure or shape.	
1. Child would not work with clay.	

TOTAL ___________

Three Dimensional Details:

Check the details listed as to whether or not each is by itself three dimensional (3D), in other words existing in space from all angles, not flattened on the back in a cookie like fashion, drawn with a tool, punched into the clay, etc. If figure or shape is horizontal, be sure that the head, body, legs and arms were left rounded all around the part, not just on the top.

		+	0			+	0
1. head/body comb.				25. toes			
2. head				26. toenails			
3. body				27. knees			
4. eyes				28. arms			
5. mouth				30. wrist			
6. lips				31. hands			
7. nose				32. fingers			
8. chin				33. elbows			
9. ears				34. mustache or whiskers			
10. hair				35. beard			
11. neck				36. penis(child's word sub.)			
12. eyebrows				37. tail			
13. eyelashes				38.			
14. eyelids				39.			
15. pupil of eye				40.			
16. teeth				41.			
17. tongue				42.			
18. shoulders				43.			
19. stomach				44.			
20. waist				45.			
21. hips				46.			
22. legs				47.			
23. feet				48.			
24. ankles							

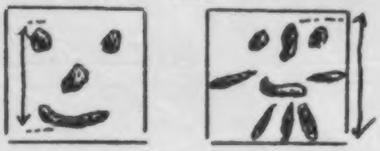
Total Number of 3D Details ________

Total Correctly Placed Physical Details __________
Total Score Proportions __________
Total Score Whole Figure or Shape __________
Total Number of 3D Details __________

TOTAL __________

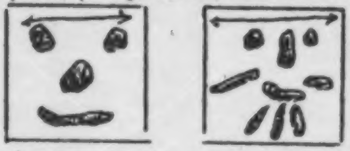
. Size of Figure or Shape:
(G. In Free)

Height of figure or total organized product as measured from top (including hat, hair, etc.) to bottom; or height of highest completed part if parts were never assembled or organized. (If child used working surface for part of product, measure from bottom of lowest part of clay to highest, as shown:)



Height ________

Width of figure or total organized product as measured at widest point; or width of the same part used to determine height. (If child used working surface for part of product, measure from clay used farthest on either side as shown:)



Width ________

(Multiply Height x Width) = Square ________

PART III

TECHNIQUE EVALUATION

A. Overall Technique Evaluation:

After reading through the process used by the child and looking at the product, if any, of the child (either the product itself if available or the photograph and/or drawing of the product), try to form a judgment of how well you think the child understood and controlled the medium of clay. In other words, did the child seem to realize clay has its own unique characteristics and that by utilizing these, expression through the clay medium is possible? The less well the child did in this area the lower his number score; the better he did the higher his number score. Please circle the number you believe comes the closest.

Low 1 2 3 4 5 6 7 8 9 10 High

B. Textures:

The child's use of textures involves any attempt made to show how a surface or material might feel or look. Textures can be made with drawings in the clay, pressing objects into the clay (stamping), adding bits and pieces of clay, etc. In order to score accurately, it must be clear that the texturing attempts were deliberate, not accidental. In scoring, check those items listed that did have texture, and add any additional items. If you know how the child textured the item, indicate by checking the appropriate box or write in how it was done if necessary.

	+	0	fingernail	tool	stamp	other (describe)
1. hair						
2. eyebrows						
3. mustache or whiskers						
4. beard						
5. jacket						
6. coat						
7. hat						
8. dress						
9. skirt						
10. shirt or blouse						
11. shoes						
12. socks						
13. belt						
14. necktie						
15. collar						
16.						
17.						
18.						
19.						
20.						

Total Number of Textures____

C. Use of Clay Tools:

Please check this section only if the child did use clay tools in making his clay product.

	YES	NO
1. DID the child use a tool at the beginning to cut the clay?		
2. DID the child use a tool during the process of making the figure?		
3. IF YES for #2, was the tool used for texturing the clay?		
4. IF YES for #2, was the tool used for connecting or smoothing parts together?		
5. DID the child use more than one type of clay tool?		
6. DID the child try to substitute clay tools for parts of the figure itself?		

A SCALE FOR THE ANALYSIS OF YOUNG CHILDREN'S CLAY SCULPTURE

DIRECTIONS FOR SCORING

In the application of the scale to individual clay pieces, scoring is done for each subtest using the following scale:

Low 1 2 3 4 5 6 7 High

If scores have been kept for previous products, it is possible to compare these with scores being made on current works. If change between products is to be examined, a slightly different scale can be applied for each subtest:

-3 A striking loss has occured between the previous and present product in the area being analyzed.

-2 A significant loss has occured between the previous and present product in the area being analyzed.

-1 A slight loss has occured between the previous and present product in the area being analyzed.

0 No change has occured between the previous and present product in the area being analyzed.

1 A slight gain has occured between the previous and present product in the area being analyzed.

2 A significant gain has occured between the previous and present product in the area being analyzed.

1 A striking gain has occured between the previous and present product in the area being analyzed.

Since both the scoring used to evaluate change and the individual scoring of products use a scale with a seven point spread, it is possible to use one scoring as a check against the other. For example, if a child has made Product A, then several weeks later Product B is compared to A, two individual scores can be given for each product plus a change score when the two products are compared with each other. By subtracting the score of Product B from A, a similar score to that found in the change score should be gotten. Therefore, if a child received a score of 4 for Product A and a score of 6 for Product B, the difference is a gain of 2 points, or +2. If the change score for the two products compared was also a +2, it could be a further support for the validity of the analysis.

It is important to remember that the highest rating possible be given to the clay product, but that the clay piece should not be rated higher than it deserves for reasons which have nothing to do with the actual product. Examples of such reasons might be: "Well, I just like it!" "He really tried hard on this piece." "She has had such a hard day today, I'll give her a break." While all of these may be legitimate reasons for sympathy, they are not justification for sculptural scores. If the Sculptural Scale is to be correctly used it will be directed only towards the product, not the child. Thus the child will not be labeled or categorized. The purpose of the Scale is to give the teacher insight into how a child or group of children interact with the medium of clay, and the analyzation of the product is the means to that end. In this way a teacher may become aware of how children can be helped as they move from one level to the next.

In the scoring levels described for each of the Sculptural Scale subtests deliberate overlapping has been built in; in this way it is hoped that greater amounts of differentiation can occur. The general explanation for each criteria can therefore be arranged broadly into seven levels, but within each level can exist characteristics which can combine together in a variety of ways. Some of these combinations will tend to support higher or lower scoring within a level. Experience with the application of the Scale will clarify the range of scoring possibilities.

EXPLANATION OF TERMS

OVERALL

Before analyzing the clay piece by applying the five subtests that follow, look at the work in its totality and attempt to arrive at an overall evaluation, a first impression, which will indicate your opinion or judgment of that clay piece as a sculptural object.

Low 1 2 3 4 5 6 7 High

SURFACE TREATMENT

In analyzing the product for this aspect, it is important to distinguish between what the child seemed to do deliberately and what may have happened accidentally. Although the accidental treatment may in fact add to the overall appearance of the piece, it should not score as high as treatment which has been thought through and skillfully handled. In clay work of young children in the beginning stages of clay work few children go beyond the accidental texturing or occasional marking of the surface.

Score	
7 6	Product was deliberately smoothed or given a rough or bumpy texture; clay was given a decorative or design pattern. The treatment complements and is integrated with the concept being presented so that the final result is one of variety and interest without distracting from the total piece.
6 5	Product was deliberately smoothed or given a rough or bumpy texture; or clay was given a decorative or design pattern. In either case the treatment seems to complement the concept being presented. However, the variety and interest which the treatment provides does distract somewhat from the final result.
4	Product is treated as above except that little integration with the subject matter is seen; or the treatment is not enough to indicate it actually does complement the concept being presented.
3 2	Product has a rough or bumpy and/or smoothed surface but in a haphazard, accidental appearing manner. The final effect may help improve the final result even though it was not planned to do so.
1	Product shows no sign it has been treated in any way on the surface; it seems to be in its natural state with no surface interest at all.

SCULPTURAL SPACE

In analyzing the product for this aspect, it is important to look for evidence that the child understood the possibilities of extending the clay in more than one direction. Even in a basically horizontal piece, there should be some evidence of the concept requiring such a limitation rather than the child being unaware of other possibilities. The same thing would be true of a basically vertical object. In addition to the horizontal and vertical possibilities, does the child seem to be able to deal with or utilize the positive and negative potentials of the clay? For example, does he see the clay as only a solid, or does he attempt to open up sections?

Score	
7 6	Product has both horizontal and vertical interest; it has been developed to about the fullest extent within the limits of the concept being presented. In addition, there is some attempt to utilize positive and negative space. The use of space is integrated with the subject or idea; the sense of space supports the final object completely.
6 5	Product has both horizontal and vertical interest; some use of positive and negative space may or may not be present. In whatever spacial treatment is used, the sense of space supports the final object but not to the fullest extent.
4	Product has either primarily vertical or horizontal interest, neither of which seems to completely assist in the development and presentation of the final idea or concept.
3 2	Product shows little understanding of how space can be utilized; basically it is a flat presentation with little integration between subject or concept and the sense of space.
1	Product shows no understanding of how space can be utilized; basically it is a flat presentation which seems to be in an unfinished or disjointed condition.

UNITY OF CONCEPTS

In analyzing the product for this aspect, it is important to concentrate on the manner in which the concepts or ideas are arranged or organized as they are made evident through the medium of clay. It is possible to go from an extreme of too much information (many details, a great many parts) which is poorly organized to the opposite extreme of too little information (details and parts are so few that the concept or idea has no support).

Score	
7 6	Product shows strong evidence of organizational ability: parts seem integrated into the concept or idea being presented. The total impression of the piece is one of wholeness, although any number of parts and details could be present. Enough information is provided through the presentation to convey clearly the concept or idea.
6 5	Product shows some evidence of organizatinnal ability; parts are somewhat integrated into the concept or idea being presented. The total impression of the piece is not quite one of wholeness; either not quite enough information or a little too much is given through the clay medium.
4	Product shows little evidence of organizational ability; parts are not well integrated into the concept or idea being presented. The total impression of the piece is not quite one of wholeness; either too much information or too little has been given through the clay medium.
3 2	Product is very poorly organized and there is strong evidence of confusion about the idea or concept. There may be either a large number of unrelated parts or almost no parts available.
1	Product shows no organizational ability; concept or idea is totally confused or completely lost in the disorganized appearance of the clay, or may not be present at all.

EXPRESSIVE QUALITIES

In analyzing the product for this aspect, it is important to concentrate on the personal expression the child has been able to make through the medium of clay. Although the surface of the clay may have been treated, the spacial qualities extended, and the con-concept presented with a high degree of organizational ability, the piece may still lack another ingredient: the child's own personal touch. Does the product give the impression that the statement made is unique and fresh, or is it instead stereotyped and dull?

Score	
7 6	The product indicates that a strong, personal statement has been made through the clay medium. The approach suggests willingness to go beyond the task or assignment and invent, discover and experiment. The expressive qualities, however, work with and support the total clay piece, not in themselves assuming the focus of the piece.
6 5	Product indicates that there was an attempt to make a personal statement through the clay medium. Some willingness to go beyond a task and invent, discover and experiment are present, but the expressive qualities and the concept are not completely unified.
4	Product indicates that the statement made goes very little beyond the requirements for the task. Only a minimal amount of originality or imagination are present, and the concept seems somewhat stereotyped.
3 2	Product indicates that the statement made does not beyond the requirements for the task. No originality or imagination are present, and the final piece seems stereotyped and typical.
1	Product indicates no personal statement has been made; there is no evidence that the child tried to express anything through the clay medium.

CLAY UTILIZATION

In analyzing the product for this aspect, it is important to concentrate on the way in which the child has used the medium of clay itself. Does the plasticity, the forming quality of the medium, become part of the total work? Does the product indicate that the unique characteristics of the clay medium were utilized and developed?

Score	
7 6	The product indicates that the clay medium has been fully utilized and developed. The plasticity and forming qualities of the clay work together with the concept being presented, giving the impression that the one completely supports the other.
6 5	The product indicates that the clay medium has to some extent been utilized and developed. The plasticity and forming qualities of the clay at least partly work together with the concept being presented, although the one does not completely support the other.
4	The product indicates that the medium of clay was utilized and developed but only to a limited degree. There is little evidence of the exploration of the unique characteristics of clay.
3 2	The product indicates that the child misunderstood the qualities of clay: he attempted to use it in an unclaylike manner, such as drawing with it. The clay medium and the concept do not seem to belong together.
1	The product does not indicate that the clay was utilized to any extent at all. No exploration of the characteristics of clay seems evident.

SAMPLE SCORING SHEETS

RECORDING SHEET FOR INDIVIDUAL SCORES:

Evaluator ______ ______ ______

SCULPTURAL SCALE

AREA	OVERALL							I SURFACE TREATMENT							II SCULPTURAL SPACE							III UNITY							IV EXPRESSION							V CLAY UTILIZATION							VI AVERAGE						
INDIVIDUAL SCORES	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
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RECORDING SHEET FOR CHANGE SCORES:
SCULPTURAL SCALE

Evaluator ______________________

AREA	OVERALL	I SURFACE TREATMENT	II SCULPTURAL SPACE	III UNITY	IV EXPRESSION	V CLAY UTILIZATION	VI AVERAGE
Change	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3	-3 -2 -1 0 1 2 3
NAME							
TOTAL							
NAME							
TOTAL							
NAME							
TOTAL							
NAME							
TOTAL							
NAME							
TOTAL							

DRAWING TEST

(Please circle correct information in all sections of this form requiring selection of one answer from several possibilities.)

PRE-INTERVENTION POST-INTERVENTION

FREE PERSON [✓ DOG]

DRAWING

Name of Child ______________________

Computer Number ____________________

ex: M___ F___

Ethnic Group: 1 2 3 4 5

chool ______________________ Number ( )

School Cluster Number ______________

Teacher ____________________________ Number ( )

Evaluator __________________________ Number ( )

Intervention Group:
1. Control
2. Enrichment A
3. Enrichment B
4. Discussion
5. Technique

Date of Test ______________________ Yr. Mo. Da.

Date of Birth _____________________ Yr. Mo. Da.

Age: Years________ Months________

Total Months ________

Grade: Pre-Kindergarten Kindergarten

Time: Begin __________ End __________ = TOTAL _____

ART I

ROCESS EVALUATION

A. In this section, a sequential record of the process used by the child as he engages in the drawing is to be written by the evaluator.

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

---

1 Verbal Activities of the Child: Please check appropriate boxes.

R = Related to Clay
NR = Not related to Clay

	+		O
	R	NR	
4. Talked almost the entire time while doing drawing without the evaluator talking to him.			
3. Talked alot on his own while doing drawing but worked quietly part of the time.			
2. Talked only when spoken to by evaluator or very little on his own while doing drawing.			
1. Did not talk at all even when evaluator asked questions (child might have used body movements such as shaking head instead of words.)			
1. Talked or sang to the drawing while working.			

C. Please check appropriate box that most closely fits the child's method of doing drawing.

	+	0
1. Concentrated on bottom of paper; did not seem to see entire paper as surface to be used in drawing.		
2. Concentrated on edges of paper; did not seem to see entire paper as surface to be used in drawing.		
3. Concentrated on corner(s) of the paper; did not seem to see entire paper as surface to be used in drawing.		
4. Concentrated on center of the paper; did not seem to see entire paper as surface to be used in drawing.		
5. Used entire surface of the paper; seemed to see whole sheet as surface to be used in drawing.		
6. Drew main part(s) of picture only; did not include background.		
7. Drew main part(s) of picture first, then did some background.		
8. Drew background first, then did main part(s) (foreground).		
9. Drew background and main part(s) (foreground) together (did not seem to see them as separate).		
10. Did not attempt to draw; scribbled over paper and stopped.		

D. Child's Feelings About the Drawing: Check number for each item which best suits child's feelings about drawing. Do not score until child is finished with drawing because child's feeling may change during process.

	7	6	5	4	3	2	1
1. Enjoyment: Child seemed to enjoy (owned intimately by child) the act of drawing; he was confident, relaxed, able to concentrate, involved with the act of creating.							
2. Spontaneity: Child did not appear to be trying to please the adult or simply fulfill an assignment; he became involved in the process of drawing to the extent that he was able to let his own feelings and ideas evolve in a free and open manner.							
3. Satisfaction: Child was pleased with his drawing; he expressed his satisfaction by his verbal or facial expressions.							

DRAWING PART II

PRODUCT EVALUATICN

A. Recognizability:

Compare this product with the drawings in the recognizability scale. Decide which of the ten categories most nearly resembles the product; circle number.

Low 1 2 3 4 5 6 7 8 9 10 High

B. Physical Details:

After child finishes his product, look at it and attempt to identify as many details as possible; give these a plus. If some details are not clear enough for you to identify, ask the child what the detail is by pointing to it and asking, "What is this?" In the appropriate box next to the detail that you asked the child about, indicate that you did ask him the question, and score the detail a plus if he identified it; a 0 if he did not, or if he says the detail is nothing. Don't ask the child to describe or tell you about his product in a general way.

	tester asked child	+	0		tester asked child	+	0
1. head/body comb.				31. hands			
2. head				32. fingers			
3. body				33. elbows			
4. eyes				34. shape of eye			
5. mouth				35. shape of nose			
6. lips				36. shape of ears			
7. nose				37. shape of hands (paws)			
8. chin				38. shape of body			
9. ears				39. shape of feet			
10. hair				40. shape of mouth			
11. neck				41. style of hair			
12. eyebrows				42. correct number of fingers			
13. eyelashes				43. correct number of legs			
14. eyelids				44. correct number of feet			
15. pupil of eye				45. mustache or whiskers			
16. nostrils				46. beard			
17. teeth				47. penis (child's word sub.)			
18. tongue				48. tail			
19. shoulders				49.			
20. stomach				50.			
21. waist				51.			
22. hips				52.			
23. legs				53.			
24. feet				54.			
25. ankles				55.			
26. toes				56.			
27. toenails				57.			
28. knees				58.			
29. arms				59			
30. wrist				60.			

TOTAL ________

C. Number of Decorative Details (See instructions for physical details).

	asked	+	0		asked	+	0
1. collar				9.			
2. leash				10.			
3. chain				11.			
4. bone (attached)				12.			
5. toy (attached)				13.			
6.				14.			
7.				15.			
8.				16.			

TOTAL ________

D. Number of Background Details (See instructions for physical details).

	asked	+	0		asked	+	0
1. dog house				9.			
2. bone				10.			
3. bowl or dish				11.			
4. fence				12.			
5. bed				13.			
6. blanket				14.			
7. rug				15.			
8. toy				16.			

TOTAL ________

Total of number of physical details ________
Total of number of decorative details ________
Total of number of background details ________

TOTAL ______

E. Correctly Placed Physical Details: Please mark each of the following according to your judgment: + (plus) means the detail is placed correctly; 0 (zero) means the detail is not placed correctly or is missing.

	+	0
1. head on top front end of body		
2. head on top of neck		
3. eyes placed on head		
4. nose between eyes and mouth		
5. mouth below nose		
6. ears on sides or top of head		
7. legs joined to body beneath or at lower sides		
8. feet or paws at ends of legs		
9. toes or claws at ends of feet.		
10. tail at back of body		

TOTAL ________

DRAWING PART II

F. Proportions:

Before filling out the boxes below, indicate on a scale of 1-10 how in your judgment this child understood proportions of a dog, or how well he was able to relate the various parts of a dog as regards size to each other.

Low 1 2 3 4 5 6 7 8 9 10 High

Check the number in each section which corresponds *most* with the product being evaluated.

Body to head

4. Body is larger than head.	☐
3. Body and head are the same size.	☐
2. Body is smaller than head.	☐
1. Not attempted or part missing.	☐

Eye(s) to head

4. Eye(s) 1/4 size of head or smaller.	☐
3. Eye(s) between 1/4 and 1/2 size of head.	☐
2. Eye(s) 1/2 size of head or larger.	☐
1. Not attempted or part missing.	☐

TOTAL ________

G. Perspective:

Check the description which best describes the product being evaluated.

7. Figure or shape was drawn so that all of it clearly looks rounded; not just an outline. or outline filled in.	☐
6. Figure or shape was drawn so that most of it clearly looks rpunded; not just an outline. or outline filled in.	☐
5. Figure or shape was drawn so that a few details clearly look rounded; not just an outline. or outline filled in.	☐
4. Figure or shape was drawn as an outline only. or outline filled in,	☐
3. Figure or shape not drawn as a definite form; scribble organization used.	☐
2. Figure or shape not organized at all; random, unconnected shapes.	☐
1. Child would not draw a dog.	☐

TOTAL____

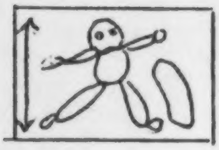
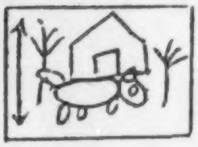
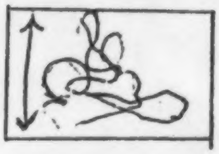
DRAWING PART II

Total Correctly Placed Physical Details______
Total Score Proportions ______
Total Score Perspective ______

Total ______

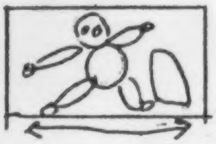
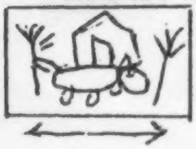
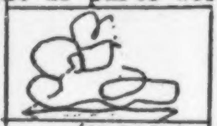
H. Size of Drawing:

Height of figure or total organized product as measured from top, including background if any, to bottom; use height of highest completed part(s) if parts were never assembled and/or scribbled.

Height____________

Width of figure or total organized product as measured from widest point; or use width of the same part above used to measure height if parts were never assembled and/or scribbled.

Width_______________

Square (Multiply Height x Width)______________

PART III

TECHNIQUE EVALUATION

A. Overall Technique Evaluation:

After reading through the process used by the child and looking at the product, if any, of the child, try to form a judgment of how well you think the child understood and controlled the medium of drawing. In other words, did the child seem to realize drawing has its own unique characteristics and that by utilizing these, expression through the drawing medium is possible? The less well the child did in this area the lower his number score; the better he did the higher his number score. Please circle the number you believe comes the closest.

Low 1 2 3 4 5 6 7 8 9 10 High

B. TEXTURES:

The child's use of textures involves any attempt made to show how a surface or material might feel or look. Textures can be made with the pencil in a variety of ways; the side of the pencil could be used to create a filled-in area that is soft and fuzzy looking, smooth, wavy, etc.; the point of the pencil could be used to create a bumpy, rough or dotted area; other textures could be made to indicate a line type of texture: weaves, patterns, etc.

In order to score accurately, it must be clear that the texturing attempts were deliberate, not accidental. In scoring, check those items listed (add others if needed) that did have texture. If you know how the child used the pencil to make the texture, indicate this in the space provided.

	+	0	How child used pencil to make texture:
1. hair			
2. eyebrows			
3. mustache or whiskers			
4. beard			
5. jacket			
6. coat			
7. hat			
8. dress			
9. skirt			
10. shirt or blouse			
11. shoes			
12. socks			
13. belt			
14. necktie			
15. collar			
16.			
17.			
18.			
19.			
20.			

Total Number of Textures ______________

(CIRCLE CORRECT INFORMATION)

COGNITIVE TESTS

CLAY VERBS TEST

PRE-INTERVENTION POST-INTERVENTION

Name of Child ____________

Computer Number ____________

Sex: M ___ F ___

Ethnic Group: 1 2 3 4 5

School ____________ Number ( )

School Cluster Number ____________

Teacher ____________ Number ( )

Evaluator ____________ Number ( )

Intervention Group:
1. Control
2. Enrichment A
3. Enrichment B
4. Discussion
5. Technique

Date of Test ____________ Yr. Mo. Da.

Date of Birth ____________ Yr. Mo. Da.

Age: Years _____ Months _____

Total Months ____________

Grade: Pre-Kindergarten Kindergarten

Directions: Use two blocks of clay somewhat rectangular in shape. Ask the child to do with the clay what he hears you say as you read the following statements. If the child does not understand the directions, read the statement again, but if the child still does not know what he is being asked to do, go on to the next verbal statement. Mark a plus (+) for those verbal statements the child understands; a minus (-) for those he does not. Use back of form for any comments. (Have clay tools available.)

☐ 1. Roll the clay.
☐ 2. Squeeze the clay.
☐ 3. Pinch the clay.
☐ 4. Pull the clay.
☐ 5. Flatten the clay.
☐ 6. Press the clay.
☐ 7. Fold the clay.
☐ 8. Take away some clay.
☐ 9. Build the clay higher.
☐ 10. Draw in the clay.
☐ 11. Remove some clay.
☐ 12. Smooth the clay.
☐ 13. Shorten the clay.
☐ 14. Join the clay.
☐ 15. Form a point with the clay.
☐ 16. Add to the clay.
☐ 17. Carve the clay.
☐ 18. Lengthen the clay.
☐ 19. Texturize the clay.

TOTAL ________

VERBAL ENUMERATION OF: PERSON/DOG

ADMINISTRATION

Five (5) minute time limit.

SAY: Tell me the parts of a person (dog) and what a person (dog) has - like eyes, head, or hat, (collar.) I will write them on this paper and we'll make a long list. Now, tell me the parts of a person (dog) and what he has. (If the child stops, encourage him.)

SAY: You know lots of things. Tell me more. (Wait. Give only one more encouragement. Stop if he does not proceed.)

STOP AT 5 MINUTES.

NOTE: If the child starts to respond with sentences:

SAY: No, just tell me the parts of a person (dog) and what a person (dog) has.

(If he persists with sentences allow him to continue and record what he says. If the child repeats items list these too. Write everything the child says.)

VERBAL ENUMERATION: PERSON / DOG (CIRCLE)

PRE-INTERVENTION

Name of Child ____________________

Computer Number ____________________

Sex: M ___ F ___

Ethnic Group: 1 2 3 4 5

School ____________________
Number ( )

School Cluster Number ____________

Teacher ____________________
Number ( )

Evaluator ____________________
Number ( )

POST-INTERVENTION

Intervention Group:
1. Control
2. Enrichment A
3. Enrichment B
4. Discussion
5. Technique

Date of Test ____________________
Yr. Mo. Da.

Date of Birth ____________________
Yr. Mo. Da.

Age: Years ________ Months ______

Total Months ________

Grade: Pre-Kindergarten Kindergarten

Directions: On the lines below write the child's responses. (Time Limit - 5 Minutes)

1. ____________
2. ____________
3. ____________
4. ____________
5. ____________
6. ____________
7. ____________
8. ____________
9. ____________
10. ____________
11. ____________
12. ____________
13. ____________
14. ____________
15. ____________
16. ____________
17. ____________
18. ____________
19. ____________
20. ____________
21. ____________
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29. ____________
30. ____________
31. ____________
32. ____________
33. ____________
34. ____________
35. ____________
36. ____________
37. ____________
38. ____________
39. ____________
40. ____________
41. ____________
42. ____________
43. ____________
44. ____________
45. ____________
46. ____________
47. ____________
48. ____________
49. ____________
50. ____________
51. ____________

DOG LIST

Student's Name ____________

Grade Level ____________

Computer No. ____________

	CLAY	VERBAL		CLAY	VERBAL		CLAY	VERBAL
ankles			eyes			mother		
arm			face			moustache (Snouzer)		
arms			fat stomach			mouth		
baby puppies			feet			nails		
back			feets			naval		
back feet			fingernails			neck		
back with fleas			fingers			nipples		
back legs			fleas			nose		
balls			food			paws		
bark			foot			pickle (rubber)		
behind			forehead			pipe (rubber)		
hind legs			four feet			pointed ears		
belly button			front feet			puppies		
big legs			fur			Red (name)		
big long stomach			gums			sharp teeth		
big nose			guts			shoe		
black fur			hair			side		
black & white things			hair on his back			small leg		
blood			hands			socks		
body			head			sparkling eyes		
bones			heart			spots		
bottom			her baby pups			stomach		
box (his tummy)			hips			string		
brain			his name			stripes		
brains			huls			tail		
butt			inside			tail that never wiggles		
cheeks			jaw			teeth		
chews with teeth			jaws			thighs		
chin			knee			throat		
claws			knees			toe nails		
collar			leg			toes		
curly hair			legs			tongue		
dad			lip			tonsils		
ear			lips			tubes inside		
ear nozzles			little tiny legs			whiskers		
ears			little tiny arms			windpipes		
gg			long eyelashes			woof woof		
eyeball			long feet					
eyebrows			long tail					
eyelashes			looks sad					
eyelids			milk (the mother					

No. Alike			No. Alike			No. Alike		
No. Different			No. Different			No. Different		
Sub Total	Clay	Words	Sub Total	Clay	Words	Sub Total	Clay	Words

Total Alike ____

Total Diff. ____

	Clay	Words
Total		

PERSON LIST

	CLAY	VERBAL
adenoids		
arm		
arm pit		
arms		
ankle		
ankles		
ass		
back		
back of legs		
barrett		
beard		
behind		
belt		
belly		
belly button		
blood		
blood vessels		
blouse		
bodies		
body		
bones		
bottie		
bottom of feet		
bow		
bracelet		
brain		
breasts		
butt		
buttons		
cars		
chapstick		
cheek		
cheeks		
chest		
chin		
chin face		
clothes		
coat		
dress		
ear		
ear drum		
ear rings		
ear tubes		
ears		
elbow		
elbows		
eye		
eyeball		
eyeballs		
eyebrows		

	CLAY	VERBAL
eyelashes		
eyelids		
eyes		
eyesight		
face		
feet		
fingernail		
fingernails		
fingers		
food		
foot		
forehead		
gums		
guts		
glasses		
hair		
hairs		
hand		
hands		
hat		
head		
heel		
heart		
hip		
hips		
inside of eyes		
jaws		
jewelry		
knee		
knee bones		
knees		
koo-chee		
leg		
legs		
lip		
lips		
liver (inside a)		
lung		
lunch		
mouth		
muscle		
muscles		
nails		
naval		
neck		
necklace		
nipples		
nose		
nostrils		
pants		

	CLAY	VERBAL
personal		
pig feet		
pockets		
pony tail		
pony tails		
pot (to cook in)		
rib cage		
ribbons		
ribs		
ring		
rings		
shoes		
shoulders		
sides		
skelton		
skin		
smell		
socks		
stomach		
straws in my body		
t shirt		
tears		
teeth		
thigh		
throat		
thumb		
thumbs		
toe		
toe nails		
toes		
tongue		
tooth		
tummy		
viens		
watch		
waist		
whole body		
wind tubes		
wrist		
wrists		
your whole arm		
your thumb		

Student's Name ____________

Grade Level ____________

Computer No. ____________

No. Alike	No. Alike	No. Alike
No. Different	No. Different	No. Different
Sub Total	Sub Total	Sub. Total

Total Alike ________

Total Diff. ________

Total ________

2??

APPENDIX B

Materials Used in Teacher Training

WHAT IS EARTH CLAY?

While plasticene and doughlike clay are frequently found in preschool classrooms, earth-type clay seems to be rarely found. Because each of these has its own characteristics, a brief discussion of the advantages and disadvantages of each may be helpful.

Plasticene, which usually comes in stick form, is a manmade material. It is very responsive to temperature and is hard when cool, soft when warm. When a child uses plasticene, he must first work with it for a time until the warmth of his hands softens it into a malleable condition. Plasticene when warmed has a stick tendency, which allows for parts to stay together even when not carefully joined. However, after a short time, parts begin to separate as the plasticene becomes firmer if it is left standing. Plasticene also will leave an oily residue on hands, tables, and clothing which will be made worse if cleansed with water. (Dry toweling works well for cleaning most surfaces.) In general, plasticene allows for detailed work but is not as flexible, responsive and sculptural as earth clay. Children tend to use it to make small, detailed and involved products, but seem less able to integrate parts into a well-made, sculptural whole.

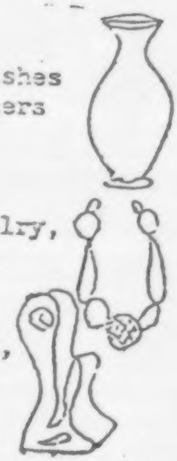
Doughlike materials (Playdough, salt clay, cornstarch or flour-type clays) are also manmade. While homemade versions are relatively inexpensive, commercially available dough types are costly, particularly when compared on a pound-to-pound basis with earth clays. These materials all tend to have similar characteristics--highly resilient, spongy, soft and amorphous. While lending themselves well to flat type products, such as cookies or relatively undetailed round forms (balls), doughlike materials do not allow for sculptural products. It is difficult to texture and parts tend to assume similar, rather shapeless identities. Connections are often difficult due to this quality, and smoothing connections to create a well-formed aspect is difficult. Children enjoy the kneading and pounding qualities of doughlike materials, and as for very young children, it can fulfill a need. However, it does not permit the child to develop any sculptural awareness, and cognitive skills are much less likely to be developed through this medium. Doughlike materials need to be tightly wrapped to maintain softness and will mold after a time (refrigeration helps).

Earth clays come in a variety of types, ranging from finely gained white high-firing clay to lower-firing red and brown types. Since these clays are natural materials from the earth, they are moist, highly responsive to forming and easy to shape. Unless allowed to become too wet or too dry, earth clay is highly sculptural and allows for texturing, detailing, and connecting parts. It, like doughlike materials, lends itself to pounding and kneading at the beginning stages of clay development, and, in fact, should be part of the first steps in most clay work on all levels. Earth clay, in addition, gives the child endless opportunities for producing ideas within one session; it can be reshaped and reformed easily. Unlike plasticene, earth clay is immediately ready for the child's ideas. Firing these clays is necessary if products are to be kept. However, unfixed earth clay can be kept in a tightly closed container and re-used over and over. (There are several types of clay now available that do not require firing but dry to a finished kind of state; these are referred to sometimes as self-hardening.) It is necessary to work with earth clay in order to keep it in good working condition, but with only a small amount of experience, this becomes an easy task.

Earth clay comes in powdered form ready to mix with water or in moist condition (usually in 25-lb bags). It is relatively inexpensive, especially if it is reused over again. Even dried earth clay, which has not been fired, can be reprocessed and made into useable clay, so it is a material which has little waste.

CLAY . . . AND YOU . . . AND YOUR CLASSROOM!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Clay is one of mankind's oldest mediums:



Functional: pots, bowls, dishes
storage containers
water jugs
etc.

Decorative: figurines, jewelry,
tiles, mosaics,

Scuptural: animals, people,
free forms

Clay comes from the earth, and the earth itself gives the clay its color. Thus we can find in some parts of the world red clay, in others white, and many shades of brown and gray.

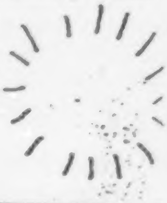
CHILDREN LEARN ABOUT CLAY IN STAGES:

FIRST, MANIPULATE IT!

**Touch, squeeze, poun
smooth, pinch . . .**

THEN, SHAPE IT . . .

**Circles, coils, ball
pancakes,**



FINALLY, CREATE WITH IT!

TIPS ON USING CLAY IN YOUR CLASSROOM

1. try to include the kids in your preparations; let them do the work whenever possible.
2. don't begin until you know all is ready!
3. have two damp paper towels for each child at his workspace.
4. don't work on newspaper or other thin types of papers.
5. don't put water on the tables; don't have water near clay.
6. don't allow clay to go down the sink drain; it doesn't dissolve
7. keep clay off the floor; if it gets there, clean it up immediately (atay friends with the janitor!)
8. encourage children to bring an old "daddy-size" shirt, especially if they usually come in nice clothes.
9. try to make the kids feel clay is a special material, and they are special kids allowed to use it!
10. even if you secretly have your doub act as though you believe clay is a worthwhile, valuable way for a child to express himself.

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STORAGE:

Keep the lid on tight if you are u
a container for the clay; otherwis
keep it in a heavyduty plastic bag
and tie it shut tight

ENCOURAGEMENT PROGRAM MATERIALS

Prepared by
Charlotte Huddle and
Teachers in the Encouragement Program

ENCOURAGEMENT GROUP NEWS

CATCH-UP

Now that you have labeled for the child what he has been doing and encouraging him to know that he can do, your next step is to offer the child the chance to converse with you about his "doings" and "makings" by saying something like "Tell me about what you are doing!" This reinforces for him his own knowledge and ability to say it. For you, it gives you the opportunity to get inside and know each child--commune with him as you let him lead into his world. There will always be children requiring you to do the "languaging" for them. You're doing so well in getting to know individuals during clay time and throughout the day. I believe that you will do what is appropriate for each child.

OBSERVE

Some days you may want to be an observer for the majority of the claytime. Children are offering so much of themselves for you to know, of their style of learning; of their knowledge; of their "social-abilities"; of their tolerance for frustration; of their problem-solving; that you will frequently discover that you are "getting-to-know" the child strictly through your observation.

As you observe the children actively involved in clay, you can observe children in the stages of pounding and flattening; of labeling that piece: (ex. "pannycake"); of making flat products; of making 3-D objects that are labeled; and of making products recognizable to you. Some children are using clay to "write" letters and words they know. Accept any expression of the child as what the child knows. To help the child move, you encourage by saying something like, "You have really flattened the clay to shape a round circle. I wonder what you can do to change its shape."

LISTEN AND WRITE

The "hum" I hear in your rooms is exciting. Children are talking with each other and with you. You are talking with the children and the "hum" sounds as life is happening vitally.

Capturing those happenings and placing an anecdotal note on the attendance sheet is helpful. Examples are: The day the three bears and their bowls appeared in a kindergarten room; or the day the Pre-K child discovered as he counted his coils that "ten-teen" is "twenty"; or the day the child found that she could write her name in clay; or the Pre-K child who made a record player whose table really turned; or the child who used the clay therapeutically - when he came to school he asked for the clay and began pounding it saying over and over "bad clay, angry clay". After a short period of time he was ready to be with the others in his class; or the day a whole table made vehicles and played together in a kindergarten room. Or the day after a bulletin board had been decorated with February's famous people, George Washington's house appeared in a Pre-K room. You have so many other special happenings to share--please do keep track on the attendance sheet.

AWARE

Objectives of the Pre-K and K Language Arts Program are divided into categories of Discrimination, Relationships, Sequencing, and Classification. Children using clay do these kind of things. Watch to see these skills in action.

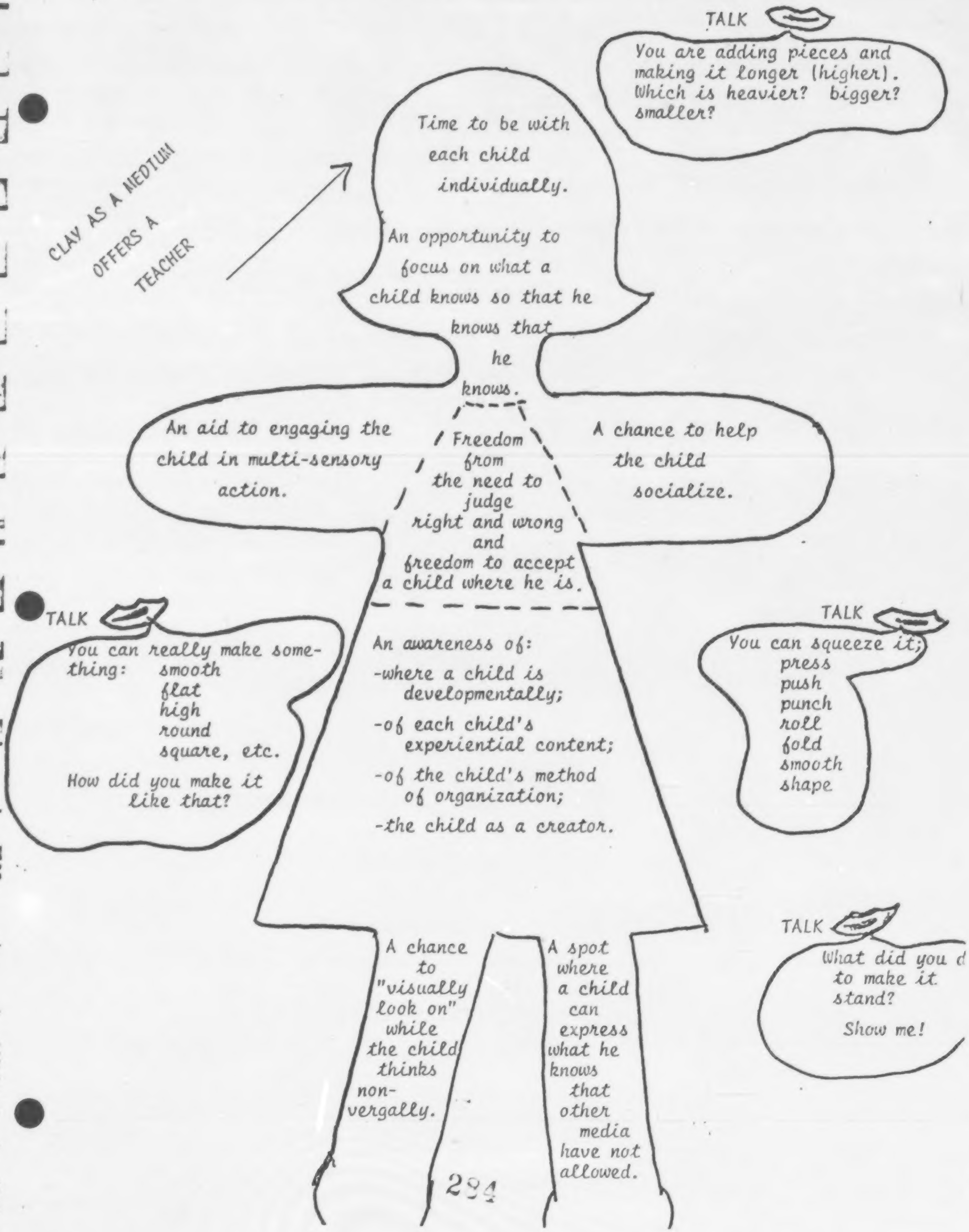
Discrimination	Position	Sequence	Classify
Comparison	Observe beginning, middle and end or first to last.	Know top to bottom or vice-versa	Make inferences and use sentences
Eye-hand coordination	Work from left to right	See graduated size	Generalize patterns
Isolate differences	See one to one correspondence	Tell a story	Know body parts
Distinguishing fact from fantasy	Seriate		Dramatize (or tell stories)
Distinguish sizes, shapes, and conditions (of clay)			
Know What's missing			
Recognize rhythm			

As Sister Winklejohn indicated, conceptualization happens as children learn to sequence, classify (or associate), see interrelationships and paraphrase. We, the teachers, conceptualize about children's development in the same way. She also stated that processing (as we do using the clay medium) is a higher form of cognitive style than memorization.

ENCOURAGE

Almost all of the behavior of the young child, including that which we designate as intellectual, has but one purpose--to optimize the level of the feeling data, to achieve the feeling of being satisfied. In the Encouragement Group you can aid each of your children to that of feeling of being satisfied. Along with this feeling of satisfaction we can also aid in the child's experiencing learning about self in at least one of these four areas:

- feelings of self-worth
- feelings of being able to cope with the world's demands
- feeling of being able to express one's self effectively
- feeling of being autonomous



CLAY AS A MEDIUM
OFFERS A
TEACHER

Time to be with each child individually.

An opportunity to focus on what a child knows so that he knows that he knows.

An aid to engaging the child in multi-sensory action.

Freedom from the need to judge right and wrong and freedom to accept a child where he is.

A chance to help the child socialize.

An awareness of:

-where a child is developmentally;

-of each child's experiential content;

-of the child's method of organization;

-the child as a creator.

A chance to "visually look on" while the child thinks non-vergally.

A spot where a child can express what he knows that other media have not allowed.

TALK

You are adding pieces and making it longer (higher). Which is heavier? bigger? smaller?

TALK

You can really make something:
smooth
flat
high
round
square, etc.

How did you make it like that?

TALK

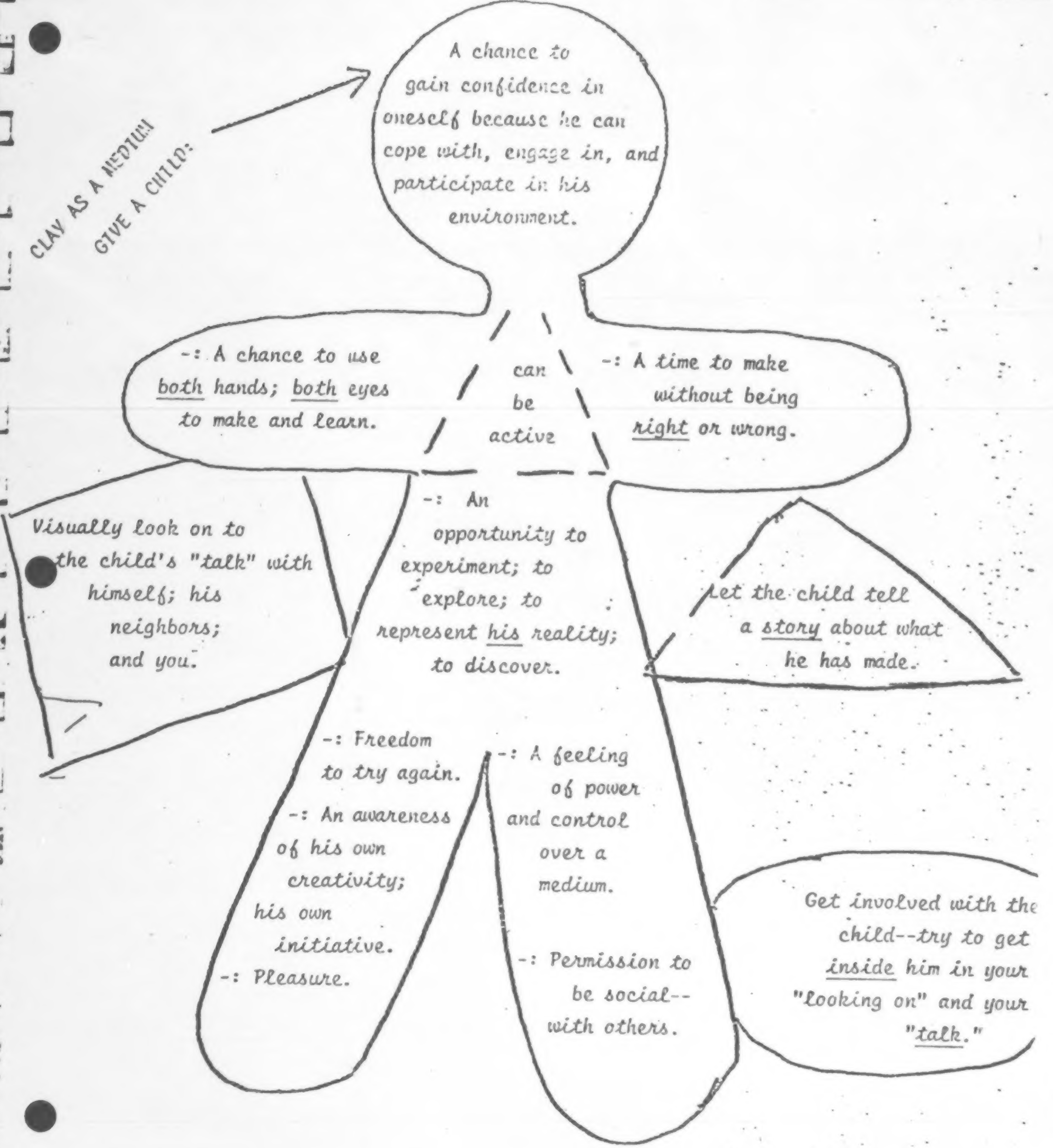
You can squeeze it;
press
push
punch
roll
fold
smooth
shape

TALK

What did you d
to make it
stand?

Show me!

CLAY AS A MEDIUM
GIVE A CHILD:



A chance to gain confidence in oneself because he can cope with, engage in, and participate in his environment.

can be active

-: A chance to use both hands; both eyes to make and learn.

-: A time to make without being right or wrong.

-: An opportunity to experiment; to explore; to represent his reality; to discover.

Visually look on to the child's "talk" with himself; his neighbors; and you.

Let the child tell a story about what he has made.

-: Freedom to try again.

-: An awareness of his own creativity; his own initiative.

-: Pleasure.

-: A feeling of power and control over a medium.

-: Permission to be social--with others.

Get involved with the child--try to get inside him in your "looking on" and your "talk."

When a child seems frustrated with not knowing what to do, this is your opportunity to encourage him that within his own experiences he has something to show in clay. Help him to think about his experiences by talking about what he saw on the way to school today or what you did in the room earlier in the day or week (this checks memory ability and his conceptualization of such) or a field trip that the class just took, or snacktime, etc. It is your task to help the child re-look at his own experiences so that he can be encouraged to believe that he is capable of knowing.

Research has some of its thorns--like attendance-taking, evaluation paperwork, scheduling--but the rose is coming. Some children are letting you know the "inside of them" better than at any other time. (We will need to know your evaluation of this affective part of the project later.)

Children learn when there is pleasure involved. We're hoping that clay is one medium that will enhance learning because of the pleasure it affords.

CLAY CONDITIONING

Clay that is ready to use should be dry enough so that it won't stick to your fingers. It should be moist enough not to crack or crumble. If clay is too sticky to use, roll it on newspaper to take out some of the moisture.

Place clay in layers with wet (paper or terry) towels between the layers. If you flatten the balls of clay a little and/or punch them with holes, they will hold the moisture better. When storing clay for more than a couple of days, turn the container upside down for at least one day. One teacher froze hers over the holiday break. That works for a period of time but not for just a few days. At Ohio, Edith Davis is wetting her hands and putting them through each ball as she puts the clay away. It's good for the clay and works exceptionally well but your manicure suffers.

On the days that the clay is very wet, the children don't need wet paper towels to moisten their hands. Their only need is for the towel to clean their hands at the end.

OBSERVATION/DISCUSSION PROGRAM MATERIALS

Prepared by
Helen Lewis and
Teachers in the Observation/Discussion Program

IMPROVING CHILDREN'S VERBAL-COGNITIVE SKILLS THROUGH THE ARTS

The Medium: EARTH CLAY

Earth clay is the medium the child will use

to express what he knows
to discover what he needs to know
to provide a content and vocabulary to verbalize what he knows

The Method: OBSERVATION AND DISCUSSION

As the child represents a concept in clay, the teacher will help him

- to self-check his perceptions by
  - observing the object(s)
  - comparing various examples of the object
  - talking about his observations, comparisons, and representations
- to discover "what else" his representation needs and why
- to experiment with the clay to find ways to represent what he knows
- to evaluate his representation in terms of his observations, etc.
- to continually self-correct based on his changing perceptions as he observes, compares, talks, discovers, experiments, evaluates, etc.

The teacher will

- Provide the medium: clay in workable condition
- Provide the boundaries of management of the clay
- Provide the stimuli in various media: verbal, visual (concrete, pictorial, etc.), tactile.

- Help the child to do the activities listed above through guided observation and discussion
- Accept the efforts of the child because they are his representations of his perceptions within the limits of his control of the medium
- Encourage experimentation and unique approaches to the problem

The Skills: PERCEPTUAL, COGNITIVE, VERBAL, REPRESENTATION IN CLAY

These skills are not discrete and separable. Therefore, they cannot be isolated for teaching. They interact, overlap, depend on each other. The teacher must be aware of them all and at appropriate times focus more on one than another. At times the looking, listening, touching, moving--becoming aware--may be most important. At another time, comparing, seeing relationships, experiencing likenesses and differences, may be the focus. In both cases, veberlizing, labeling, may facilitate the thinking process and form a conceptual basis and a vocabulary for discussing the abstract, comparing past and present experiences, and for hypothesizing for future outcomes.

The following are examples of skills for which the clay medium seems appropriate. Sample questions and activities are suggested to help creative teachers think of the possibilities available as they plan each week's lessons. The skills and suggestions are not listed in a particular sequence or hierarchy. However, as we have many levels of cognitive development among our children, one will discover various levels of operations are required by the skills and activities. Thus the teacher must be sensitive to the level of the child, be selective in her approaches, and be ready to accompany the child from one level to the next and sometimes back again in his process of growth.

SKILL	EXAMPLE OF ACTIVITY	SAMPLE QUESTIONS
Observing characteristics and detail	Showing the children the object (or a picture of the objects if reality is impossible) Help the child develop the habit of looking again and from various perspectives	"Tell me what a ________ has. ....what else? Play the game with them, "finding" things yourself when they are stumped. When a child has an idea but has no label for it, you and the other children help by providing possible words.
	Child looks at his own clay product and tells you details about it. (Be careful not to push or rush this issue. Encourage and listen for the vocabulary to appear in table discussion and in the child's interaction with the teacher.)	
	Children look at other children's work for characteristics which identify it.	"How can you tell this is a __________?"
	"What is missing?" Observing clay pieces....	"What will happen if I pour milk in your bowl?" "Will your dog hear me if I call him?"
Defining - involves classification, description, characteristics that eliminate other objects	Discussion of subject for the lesson.	"What is a __________?" e.g. A bowl is a dish. How is it different from a plate? Deeper, holds liquid, etc.
Organizing thinking	Setting could be similar to above --preparation time or during clay time or follow-up discussion. When children are listing details, note if they name randomly or if they say like "mouth, teeth, tongue, lips; legs, knees, paws..etc.	"Tell me all the things a dog has on his head." Or "You made a head, what else does an animal have on his head?"
Generalization Classification Similarities Categorization		"What do all ______(dishes, dogs, animals, etc.) have? "How are these alike?" (collection of objects in a similar classification, i.e. vegetables, fruits, etc.)
Differentiation	Make your favorite vegetable (or fruit or animal, etc.). We will guess what it is. Requires noting and representing distinguishing characteristics.	
Reasoning	Example in "What is missing?" game described above	

SKILL	ACTIVITIES	QUESTIONS
Comparing and contrasting	Story of *Three Bears* Comparing the size of the bowls. After clay bowls are made, find the biggest or papa bear bowls. Which are the tiniest bowls, highest, lowest, thinest, fattest,etc. Compare birds with animals; nests with bowls, etc.	
Spatial, temporal, and positional relationships	Can be incorporated into almost any discussion before, during, or after the modeling activity. Could play a game with the clay products as teacher gives directions similar to Simon Says: "Put the dog *beside* his house....", etc.	Bowls have insides and outsides, bottoms, tops. Dogs have fronts and backs. They climb on things, under things, jump over. Child puts dog in, on, beside, behind...the dog house.
Number concepts	Counting Quantitative concepts and words can be part of comparing and contrasting, classification, similarities, etc.	"How many balls have you made?" "Which bowl do you think will hold the most cereal?" "Which ________ will need the most (least, more, less) clay?"
Integration	When the child has had many experiences and has made many different things, observe his use of these concepts. Does he make different things and relate them to each other? Can, does, will he develop a story around his characters?	
Figure ground? ????? Creativity?!	In working with the clay, does the child make a shape accidentally and recognize and name it? Does he work from parts to whole or from whole to parts? Does this vary with his subject or does he have a constant approach?	These are areas we don't know much about. What do you observe in *your* class?
Action	In the clay modeling process, note what the child discovers that he can do with the clay. Label what he is doing. Lead him to think about what he did what he wants to do how to do it (Reasoning) why he did it and what happened	"I see you are rolling (pinching, squeezing, pounding, flattening...) the clay." "What did you do to make your bowl so round?"

TO: Observation and Discussion Group Teachers

FROM: Dr. Helen Lewis

Greetings!

Since it is so difficult to get everyone together at one time, I am going to try a news letter for communication purposes. PLEASE TAKE TIME TO READ THE LETTER. It will include reminders, information, suggestions, and shared items from other teachers who also have clay on their hands (and elbows?!)

CLAY SUGGESTIONS:

Experience is teaching us some ways to keep the clay in good condition--a MUST if the children are to be successful with it.

Line the bucket with a plastic trash bag. (For Pre-K, use two bags and two sets of clay if you are having your children work with clay morning and afternoon of the same day).

Place clay in layers, with wet towels between the layers. If you flatten the balls of clay a little, the moisture will get into the clay better also. If the clay is very hard, put a wet sponge on top of the whole batch of clay. Seal the bag tightly with a twistie. If the clay gets too wet, wrap each ball in a dry towel, then take it off and place the clay on the table until the children are through with the discussion time.

TEACHING TIPS:

New topics need to be introduced in advance, especially for the four-year-olds. The children need some time to think and observe before your formal discussion time. Some good ideas that have been used are:

Bulletin board pictures
A table or learning center display
Relating roll-call, show and tell, etc. to the topic

Visuals: OBSERVATION is as important as discussion for these young children. They do not have the memory bank of experiences that adults have. Many of these children have never been helped to look at something and talk about it. Try hard to find real experiences, and wherever possible opportunities for the children to interac kinesthetically with the object. Please pass along any ideas you have to all of us. Here are some starters.

DOGS: The humane society will bring a dog or puppy to your classroom. Think about the possibility of more than one puppy so that more children can touch and feel and play and look without mutilating the puppy!

The Tupperware Pull-apart dog has been helpful in demonstrating body parts. One teacher had a realistic stuffed dog. Plastic poodles and models are good for handling, too.

BIRDS: How about a walk around the block one day during this unit. A caged bird could be left for the children to observe for some time. Perhaps the children could try "being dogs" and "being birds" with emphasis on thinking about the likenesses and differences of body parts, why don't birds need four legs, why don't dogs fly. Some imaginative children might like to think about what a flying dog might look like!

Title I Language Development Teachers have beautiful bird pictures, which they may be willing to lend.

Did anyone get to Northland's Petting Zoo?

Boredom a problem? Don't give the children "the works" on a new subject on the first day. Decide what concepts you will teach and develop them gradually over the sessions. Keep some new item for observation, or an experience, or a problem solving question, for each session. Even though the children are making the same object, they will have a new reason, a new idea, a new insight into the problem.

"LOOK BEYOND" the classroom, at home, on the streets, should be a constant reminde to the children. Take time to listen to their experiences and ideas in response to thi "assignment."

In small group discussions around a clay table, encourage the children to talk abo their clay piece. "My dog has long legs and a short tail." "My dog has short legs and a long tail." Thus the children see differences and options. "My dog has a head, body and four legs." "My dog has a head, body and four legs, too." Here the children are looking at similarities. By verbalizing they are also redirecting their observations.

BE AWARE ---

The child's clay product is an index of his perceptions. If the child is still making heads with legs and no body, for example, we need to give him more experience and time to change his perception, NOT show him how to make the clay object "our way." Watch for the change in the clay. Help him to look again in many ways, talking about what he sees. Be delighted over even small indications of development.

Before drawing too-quick conclusions about a child's clay product, ask him to tell you about it. He may have a good reason for what he did. If not, telling you about it requires that he look at it again. At that time he often sees omissions, or incongruities himself. This self-checking is much more productive than teacher corrections.

Keep clay time a happy time. Be positive in your criticism. Always look for improvement, not for what he doesn't do.

SUGGESTED LESSON PLAN FORM

Date______________ Clay Subject______________ Name______________

SESSION ONE

Readiness	Clay Time	Follow-Up
Materials Verbal: Visual : Tactile: Skill-focus for the session: Discussion, questions, etc.	Directions: Questions, games, activities, discussion around the clay:	Discussion/activities: Preparation for next session: Observations and notes on "What happened

SESSION TWO

Materials Verbal: Visual: Tactile: Skill-focus for the session: Discussion, questions, etc.	Directions: Questions, games, activities, discussion around the clay:	Discussion/Activities Preparation of children for next session: Observations/Notes on "What happened?"

PLANNING HINTS:

Have some concepts in mind to develop with the lesson, BUT....

Be aware of individual children, take clues from what they do to decide what is the next move with them..

You may want to group sometimes to help some particularly slow or fast children with a concept. Just consider how much the children learn from each other before deciding to do homogeneous type grouping.

NOTES FROM THE "FIELD":

Mrs. Taylor from Trevitt finds that her children enjoy the "clay corner" during work choice even when they have clay twice a week as a class. Do your children choose clay too?

Beatty Park's Pre-K children had a birthday party for Henry, the class stuffed-dog masc Spontaneously, a little girl suggested it. Everybody made a dog and food for him, then they brought the dog and the food to Henry's place at the table. Some made presents for Henry, too, including Gainesburgers and bones! Everybody sang "Happy Birthday," and helped Henry enjoy his presents. You should have seen the planning, the language, the claywork - SERENDIPITY!

1. Free: First session.

Learn how to get clay out.
Learn how to moisten clay.
Learn vocabulary: clay : differences between real (earth) clay and others
moisten
whole
part
texture
Learn how to keep clay on tables.
Learn how to clean hands, using paper towels (wet)
Learn how to clean tables.
Put all clay pieces in center of table. (How to pick up)
Have children talk about and observe:
similarities - subject, shape, size
differences - " " "
upright forms ("air all around it")
horizontal (lying down) forms

Have children learn how to put clay away, and wash hands.

Second session.

Have children try to remember what they made during the first session.
What could you do better this time?
What did you like that you did last time?
What did you learn about clay; what can it do? What can*t it do?
Learn how to get clay out. Remind.
Learn how to moisten clay. Remind.
Use clay vocabulary whenever possible.
Learn how to keep clay on tables.
Learn how to clean hands, using paper towels.
Learn how to clean tables.
Put all clay pieces in center of table and discuss and observe as above.

Have children learn how to put clay away and wash hands.

NOTES:

Pottery; First Session.

Readiness: Set a mood earlier in the day that will start the children thinking about pots:

- uses
- who makes them? why?
- what can they be made out of?
- other names we can call pots:
  - bowls, containers, dishes, etc.

If you are doing any units (such as Indians) which will tie in, try to fit these before the first pottery clay session.

This should begin to be second nature eventually! → *

Follow the same procedures in clay management as in the two free clay sessions.

Have the children gather around in a circle (on the floo if possible) and look at a collection of pots with you. Have children look for shapes,

- sizes high-low
- textures
- wide-narrow
- vertical- air exists all around
- why does it need sides?
- why does it need an opening?
- why does it need a bottom?
  - Should the bottom be flat? Why?

Ask for more!

Vocabulary:

- Pottery
- Texture
- Wide-narrow
- vertical
- inside-outside
- Pinch pot
- Designs HL
- Texture HL
- Ball

Use as often as possible

Demonstrate how to form a pinch pot.
Have children go to tables; get out clay.
Have children form a pinch pot with you.
Have children squeeze out pinchpot into ball again; the make their own pinchpot.

High level child: How can you put texture on it
How can you make designs on i
How can you change the shape but keep it a pot or bowl?

Average level: How can you change the shape but keep it a pot or bowl?

Low level: Can you roll the clay into a

2. Pottery: Second Session

Talk about what was done first session. Display collection of pots.
Demonstrate pinchpots again, then shaw how to add on a coil. Demonstrate how to make a coil first, then rough up top edge of pinch pot, and add coil.
Have children work with clay.
Take low level children and either teacher or aide ha them make a pinch pot with you. Don't do coil unles they understand pinch pot idea.

High level child: Same as first session but encourage use of coils for han designs, etc.

3. Foods: First Session

Readiness: If possible, talk about foods during the regular snack time each day for the week preceding the clay foods. Refer to such points as:

similarities: shape, size, color taste, feel, texture etc.
differences: as above
which have mostly one large part - primarily a whole?
which are made up of many small parts

Use large colored pictures of food on wall-frieze

First part of clay lesson on fodds: talk with the children about what foods could be put into a bowl; which foods hav to be put into a bowl (or dish or pot). Ask them to think of a food they could make with clay that they could put in a bowl they make of clay. Ask them to make the bowl first; talk about the size of the bowl being used to determine th kinds and sizes of food they could make. (Use pinchpot meth with the making of the bowl; remind children of procedures)

Clay: either pass out two or three smaller sized pieces or one large (grapefruit size) piece and ask children to break into pieces for each part, bowl and food.

Follow the same procedures in clay management as in the first two clay session.

DEMONSTRATE how to form a whole shaped fruit, vegetable, etc.; then demonstrate a food that has parts. Tell the children to make the bowl; then put into it whatever kind of foods they wish. Put pieces of real or plastic fruits vegetables, etc., into pottery bowls and dishes used last

Vocabulary:
Pottery
Texture
Large-small
Parts-Wholes
Coils
Designs

Higher level child: encourage more than one pinchpot and coils; encourage textures on bo pot and fruits, vegetabl etc. encourage wxperimentatio

Average level child: encourage carefully made pinchpot; encourage use of coils. encourage textures

Lower level child: aide or teacher make pin pot along with children; encourage observation of shapes in making foods: balls, coils, panca shapes, etc.

3. Foods: Second Session

Discuss with the children what they made during the first session.

What worked well?
What didn*t work?
Did small bowls hold too little to be satisfacto
Did too much food in a bowl make it fall apart?
What could be done about that?

Foods: Session Two, continued.

Vocabulary:

Lip of bowl
Stem
Decoration

Observe and discuss again the clay bowls and pots from previous week and put examples of real and plastic foods into these. Discuss other kinds of foods not there which could be put into the bowls. Have large colored pictures up.

Ask children to make bowls first again, this time with some extra parts such as handles, decorations, lip, (top edge of bowl, pot, etc.); then make food to put into bowl. Ask children to add to fodds more in way of texture, extra parts such as stems, leaves, etc.

In addition to above encourage higher, average, and lower level child (technique-wise) to work as in first session of foods; aide or teacher may need to demonstrate pinch pot again to lower group children who still do not understand.

Notes:

4. Dog: First Session Readiness: Walk to a nearby yard where there is a dog, after checking first whth owner, and allow children to observe and discuss dog.

Roleplay dogs during gym time.

If available, have children use dog puppets during play time week ahead.

If possible, have a dog visit the classroom briefly the day before the first session of dog.

Have children discuss their own or neighbor(s dogs.

Read a story about a friendly dog.

First part of clay lesson on dogs: Have children sit in a circle and discuss with them what they have learned about dogs. Point out such things as:

Similarities and differences in size, shape, color, texture,
proportions
number of legs
shape of head-nose
shape of body
length of tail
size of feet
inside vs. outside (mouth)

Vocabulary:
Movement

Parts - Whole
Movement
Sounds

Show examples of dog (stuffed animals, plastic or rubber models) and set these up somewhere if some children might like to refer to them later.

Demonstrate how to work out a dog using both whole to part and part to whole methods. To be sure children do not copy demonstration models, put back into blob shape immediately.

Follow the same procedures in clay management as in the first two clay sessions.

As children get clay and begin to work with it, walk about the room and encourage good connection of parts for those working from part to whole; emphasise relationship of size (proportion) for children working with whole to part.

Higher level child:	encourage lots of texture, movement, additional detail, background, smoothing parts.
Average level child:	encourage texture, additiona detail, good connection of p (only if basic dog form emerg
Lower level child:	encourage shape and form, control over clay.

4. Dog: Second Session

First part of second session on dogs: Have children sit in a circle and discuss what they did during the first session. Bring out again those points emphasized during previous lesson; encourage children to talk about their successful and unsuccessful methods of working with the clay. Again show examples of dogs and point out any details you noticed most or many children did not put into their clay expression during the first session. (Don't ask the children to make these in the clay; just point them out.)

DEMONSTRATE: How to use clay tools.
- Connecting parts
- Texturing
- Shaping
- Cutting

Explain about using them only for the clay and only if child wants and needs them.

FOLLOW THE SAME PROCEDURES IN CLAY MANAGEMENT AS IN THE FIRST TWO CLAY SESSIONS.

As children get clay and begin to work with it, walk about the room and encourage good connection of parts for those working from part to whole; emphasize proper use of clay tools for those children .using them. Allow the children to spend 4 or 5 minutes at the beginning just experimenting with the tools on a lump of cla Then encourage them to begin making a dog.

Use same encouragements for the high, average, and lowe level children as in first session of dog.

NOTES:

5. Dog, Food and Dish (bowl): First Session

Readiness: continue to refer to dogs in class discussions; do roleplaying in gym again if time permits; have puppets availa if possible; try to get children to think about what dogs eat and when dogfood would need to be in a dish or bowl.

VOCABULARY:

- pinchpot
- textured
- connecting
- sizes
- clay tools
- blending

First part of clay lesson on dog, food and dish: Have children sit in a circle and discuss what they have found out about wha dogs eat and when a dish or bowl is needed Have several kinds of dog bowls or dishes on display and talk about the shapes of these. Ask the children if they remember how to make a bowl shape; see if they will say pinchpot. Ask what would have to be different to make a bowl look like it belongs to a dog rather than a person. Ask children to think of how they might ma food to go into the dish.

Refer to:

size of bowl matching size of dog
food size fitting size of bowl
what kind of dog to make: choice
texture on dog, dish, food.
parts to whole, whole to parts

FOLLOW THE SAME PROCEDURE IN CLAY MANAGEM AS IN THE FIRST TWO CLAY SESSIONS.

As children get clay and work with it, wal around the room and encourage good connect of parts for those children working from part to whole; encourage proper use of cl tools for everyone.

Higher level child: encourage lots of textures, movement, additional detail, background, smoothing parts together. (blending)

Average level child: encourage texture. additional detail, proper way of making pinchpot bowl or di

Lower level child: encourage shape an form, control over clay; if a children cannot remember pinc pot demonstrate for them.

CLEAN UP HINTS: Show children how to cle off clay tools and put them a

5. Dog, Food and Dish (bowl):

Second Session

Repeat same directions as in first session for dog, food and dish; try to identify those childr who did not seem to understand how to work with t clay; i. e., they seemed to have to struggle to get the dog to stand, the pinchpot wouldn't work, etc. If a large enough group exists with similar problems, either the teacher or aide should take that group separately and work with them; demonst correct methods, how to use clay tools, ways to texture, etc.

NOTES:

6. Birds: First session Readiness: put up a bird feeder outside a window of your classroom, if possible.
Have large picture books of birds available.
Show a film that shows birds, especially in fligh
Have children role-play birds after seeing film or watching real birds.

VOCABULARY:

- whole to part
- part to whole
- egg shape- oval
- texture
- beak
- feathers
- tail
- wings
- legs
- claws
- position

First part of clay lesson on birds: Have childre sit in circle and discuss what they have found o about birds. Show them a few pictures which show very different birds; ask the children questions about these. Have some stuffed birds, puppets, etc., to show and display. (At least three).

Demonstrate how to make bird from whole to part (start with egg shape, watch egg change into bird) then from part to whole. Explain children can use either approach. Talk about texture as in the feathers, and the position of the bird (flyin sitting, standing). Discuss ways to get the bird to stand up on two little legs- get the children to come up with solutions.

REMEMBER: don*t leave your bird where it can be copied.

FOLLOW THE SAME PROCEDURE IN CLAY MANAGEMENT AS IN THE FIRST TWO SESSIONS.

BE SURE to use as many clay verbs as possible.

As children get clay and work with it, walk around the room and encourage good connections of parts for those children working from part to whole; encourage proper use of clay tools.

Higher level child:	encourage lots of textures, movement, additional detail, size relationships of parts (proportion), smoothing cla parts together (blending).
Average level child:	encourage lots of textures, additional detail, blending.
Lower level child:	encourage getting a good birdtype shape or form; re-demonstrate for some of the children if necessary. Control of clay is main ide

6. Birds: Second session: Continue discussing birds, and try to get the children to see more similarities and differences as well as more details. Mention bird families and relative sizes of members: father, mother and babies.

Demonstrate again the two basic methods of making the bird shape. (Ask the children to tell you the steps). Discuss the same kind of things as in first session, but in addition the possibility of making several birds (family group).

FOLLOW THE SAME PROCEDURE IN CLAY MANAGEMENT AS IN THE FIRST TWO SESSIONS.

See first session for work time procedures and levels of children.

NOTES:

7. Bird and Nest: First Session: Readiness: If you are able to take a walk in the area of your school, try to find trees that have nests low enough for children to see (bushes might have a few as well). Try to find some pictures that show birds in nests; if possible, bring in at least one real bird"s nest.

nest
nest materials: twigs, grass, etc.
bird parts
eggs

Reinforce clay verbs

Have children sit with you and discuss birds and nest

Why do birds need nests?
Why aren't all nests the same size?
Why aren't all nests the same shape?
What are nests made out of? How could clay be textured to look like twigs, grass, etc.?

Discuss eggs, and how they hatch into the babies, then how the babies spend their first days in next, etc.

DEMONSTRATE how to make a pinchpot shape into a nest; use clay tools and show how to texture. Then demonst making a nest from coils. Ask the children which way they prefer to use. Discuss sizes and shapes. Tell the children to make a nest first, then make a bird, a bird family, or eggs and a bird. (Mention about dividing up the clay ahead of time into 2 or 3 pieces, or do this yourself as you pass out the clay. With preK especially, it would be a good idea to give them just enough to make the nest, then give them additional clay.

FOLLOW THE SAME PROCEDURES IN CLAY MANAGEMENT AS IN THE FIRST TWO SESSIONS.

As children get clay and work with it, check and see if each child understands he is to make a next first. Encourage connection of parts for those children who do work parts to whole. Encourage proper use of clay tools. Then encourage children to make bird(s); try to get children to make more than just eggs, especial average and higher children.

Higher level child: Encourage bird families; lots of textures on birds and nests (smoothi clay surface counts as a texture, by the way. Work toward good size relationships, good connection of parts, utilization of clay too

Average level child: Encourage more than one thing to put into the next; also details and texture.

Lower level child: Encourage getting a good nes type shape; redemonstrate for those who need Encourage some type of bird shape for nest.

7. Bird and Nest, Continued: Second session.

Readiness: See first session of bird and nest.

Have children sit with you and talk about what they made the previous time. Try to bring out additional information; get the children to realize that if they had a problem with the clay (nest got too thin, bird was too big for the nest, etc.) they can solve the problem by doing . . .

DEMONSTRATE again the basic methods for making the nest and texturing it. Get the children to tell you the steps for both the kinds of nests.

See items mentioned under demondtrate for first session.

FOLLOW THE SAME PROCEDURES IN CLAY MANAGEMENT AS IN THE FIRSTTWO SESSIONS.

Follow same procedure for helping childzer during clay time as in first session.

NOTES:

8. Free: First Session.

Explain to the children that they can make whatever they like with the clay, but at the conclasion of the time should be prepared to say something about either the clay piece itself or what was done to the clay (clay verbs). Put out the clay tools, and encourage the children to use them but only for intended purposes (not for parts of an object, as play things in themselves, etc.)

As the children begin to work, comment in positive ways about children who seem to be using methods we have tried such as coils added to an object, smoothing parts together after roughing up surfaces, texturing, decorating, etc.

Reinforce clay verbs.

Don't insist on a product but remind the children about five minutes beforehand that we will be sharing our clay ideas before we cleanup.

During the idea sharing time, encourage the children to talk, even if it is no more than telling what was done to the clay. See if the children can tell you what methods were used in varioas clay pieces; also mention sizes, shapes, thin or thick walls or parts, vertical or horizontal objects, textures, designs, decorations, etc. Strees those objects which exhibit good craftsmanship; i.e ., the object looks wellmade and welldesigned.

8. Free: Second Session.

Same as first session; try to come up with a different way to do the sharing at the end. You might pick just three children and ask them to discuss and exhibit their pieces at each table; you might have a parade of pieces around the tables; you might exchange pieces and have children guess what something is and how it was made, etc.

Emphasize those items mentioned above and be sure you let the children know how special they are in being chosen as clay workers out of all the children in Columbus!

NOTES

LESSON PLAN FORM FOR TECHNIQUE PROGRAM

9. Farm Animals: First Session. Readiness:

VOCABULARY:

First Part of Lesson:

Demonstrate:

FOLLOW THE SAME PROCEDURE IN CLAY MANAGEMENT AS IN THE FIRST TWO SESSIONS.

As children work with clay:

Higher level child:

Average level child:

Lower level child:

APPENDIX C

Teacher-Evaluation Materials

ATTITUDE TEST ADAPTED FROM BUES,
PURDUE RESEARCH FOUNDATION.
FORM A

Check which applies to you:

Teacher ________ Aide ______ Date ________________

School ______________________________

Teaching Experience:
Pre K: _____
K: _____
(Number of years)

Grade level taught: Pre Kindergarten ___

Kindergarten ___

Total teaching experience:
______ years

Directions: Following is a list of statements about clay activities. Place a plus sign (+) before each statement with which you agree. Try to relate the statement to your own teaching situation.

☐ 1. Clay activities are better than anything else.

☐ 2. I like clay activities better than anything I can think of.

☐ 3. Clay activities are profitable to everyone.

☐ 4. Clay activities are very worth while.

☐ 5. Clay activities have an irresistible attraction for me.

☐ 6. I enjoy clay activities.

☐ 7. Clay activities are liked by almost everyone.

☐ 8. I like clay activities well enough to do them on my own.

☐ 9. Clay activities make for a happier classroom.

☐ 10. Clay activities serve a good purpose.

☐ 11. Clay activities develop cooperation.

☐ 12. Clay activities should be appreciated by more teachers.

☐ 13. Clay activities could be accepted more and more as time goes on.

☐ 14. Clay activities have advantages.

☐ 15. If clay activities were used more they would develop into a valuable part of the curriculum.

☐ 16. There is no reason for stopping this type of activity.

☐ 17. Clay activities are all right as a pastime.

☐ 18. I like clay activities a little.

☐ 19. Clay activities are all right in some cases.

Form A continued

☐ 20. Clay activities are all right in a few cases.

☐ 21. My likes and dislikes for this activity are balanced.

☐ 22. I dislike this activity but I do not object to others liking it.

☐ 23. Clay activities aren't so bad but they are very boring.

☐ 24. Clay activities have limitations and defects.

☐ 25. I like many activities better than these.

☐ 26. Clay activities have several disadvantages.

☐ 27. Clay activities have several undesirable features.

☐ 28. Clay activities are disliked by many people.

☐ 29. Clay activities should not be tolerated when there are so many better ones.

☐ 30. Clay activities are not endorsed by logical-minded teachers.

☐ 31. Life would be much happier without clay activities.

☐ 32. Clay activities cannot benefit anyone who has common sense.

☐ 33. Clay activities are a waste of time and money.

☐ 34. Clay activities accomplish nothing worthwhile either for the individual or society.

☐ 35. Clay activities are sinful.

☐ 36. I hate clay activities.

☐ 37. Clay activities are the worst thing in a curriculum.

Comments:

Objective: Document when examiner has mastered skills necessary to administer the clay modeling, drawing and verbal cognitive abilities tests.

Instrument Training Session
Checklist (Part I)

Criteria for Test Administration

Social Aspects:	Yes	No
1. The teacher makes the child feel at ease.	___	___
2. The teacher encourages the child to respond freely.	___	___
3. The teacher asks questions in a manner which conveys confidence in child's ability.	___	___
4. The teacher praises and encourages the child in a natural, supportive voice and vocabulary.	___	___

Technical Aspects:	WPPSI	Clay Modeling Observation Scale	Drawing Observation Scale	Picture Reading Test	Clay Verbs	Embedded Figures	Verbal Enumeration
1. The teacher enters childs responses in correct place on the form.	___	___	___	___	___	___	___
2. The teacher explains procedure to child.	___	___	___	___	___	___	___
3. The teacher organizes materials and follows the test administration directions.	___	___	___	___	___	___	___
4. The teacher is attentive t[illegible]ime limitations on the t[illegible].	___	___	___	___	___	___	___

Objective: Document when an examiner has mastered skills necessary to evaluate and interpret data obtained from the Clay Modeling Observation Scale and the Drawing Observation Scale.

Instrument Training Session
Checklist (Part II)

The examiner is able to satisfactorily:	Clay Modeling Observation Scale	Drawing Observation Scale
1. Figure total scores correctly.		
2. Use available space to record subjective statements of child's process during testing situation.		
3. Indicate child's responses using response categories on instrument.		
4. Record responses that are reliable with other examiners.		
5. Record objective responses compatible with subjective statements of child's process.		

Objective: Record when trainee has mastered skills necessary to implement a selected instructional strategy.

Verbal Cognition Program Intervention
Checklist

Teacher ______________________ Date ______________________

Intervention Group ______________________

Observer ______________________

After participating in the intervention program training sessions, the teacher is able to:

	Yes	No	(Additional Training Needed)
1. Provide the clay in a workable condition.	___	___	
2. Provide the boundaries of management of the clay.	___	___	
3. Accept the efforts of the child since they are representations of the child's perceptions within the limits of his/her control of the medium.	___	___	
4. Encourage experimentation and unique approaches to the problem.	___	___	
5. Provide the stimuli for instruction in various media (verbal, visual, tactile).	___	___	
6. Help the child perform prescribed activities through guided observation and discussion.	___	___	
7. Teach the child basic prescribed techniques for working with clay.	___	___	
8. Help the child perceive and understand clay as a communicative as well as expressive medium.	___	___	

CONTROL GROUP QUESTIONNAIRE

I. What is your overall classroom set-up, i.e., centers? activities?

II. What use do you make of your play corner, i.e., socio-dramatic? games?

III. What kind of art materials do you believe are important?

A. Do you have clay in your classroom? Why? or Why not?

What kind? Clay, playdough, or plasticene? (condition?)

When do you offer clay? How?

B. Do children know about the clay?

Is it a choice or must each child use it regularly?

Is it used individually or by groups?

How do you direct the activity using clay? For example: Do you assign a subject or do the children have free choice, and do you help the child with technique?

HOW CONTROL TEACHERS PERCEIVED CLAY AS AN ART MEDIUM

Interview 13 teachers = (9 Kindergarten + 4 Pre-kindergarten)

A. Teachers who had plasticene available in room as a free choice activity. N = 9

1. Nine teachers used this material in free choice only (6 K + 3 PK).
2. One teacher used earth clay in addition but only once at beginning of year (1 PK).
3. Two teachers used salt clay as a group activity--had children make this material in class activity (2 PK).

B. Teachers who used plasticene to help develop children (2 K + 1 PK) N = 3.

Used (1. One teacher used plasticene to help teach shapes (1 K).
Periodically(2. One teacher used plasticene to help develop fine motor skills
But Not ((dexterity) (1 PK).
Frequently (3. One teacher used plasticene to teach letters--taught coil making (1 K).

C. Teachers who used no clay or plasticene and saw art as unimportant. N = 1 (This teacher said she was traditional and did only cut/paste and crayon-type art.)

D. Replies to question "What art materials are important to preschoolers?
Answers were: 1. easel painting 3. cut/paste
2. finger painting 4. crayoning

Only three teachers also added clay - (usually playdough).

Objective: Document the degree to which each teacher implements the instructional strategy assigned in the fashion prescribed in the training session.

Verbal Cognition Program Intervention
Observation Scale

Teacher ______________________ Date ____________________

Intervention Group ____________________

Start Date ________________

Observer ____________________

	Yes	No
1. Does the teacher appear to understand the general goal of the intervention group in which he/she is involved?	___	___
2. Does the teacher manage the organizational problems of using clay in the classroom?	___	___
3. Does the teacher keep the clay in good condition for the children to use?	___	___
4. Does the teacher overstress cleanliness?	___	___
5. Does the teacher herself appear to be comfortable with the medium of clay?	___	___
6. Does noise created by clay activities appear to disturb the teacher?	___	___
7. Does noise created by clay activities appear to disturb the students?	___	___
8. Does the teacher use practices which were discussed in the intervention training group?	___	___
9. Does the teacher develop additional intervention practices to use with the class?	___	___
10. Are additional intervention practices used by the teacher appropriate to the general goal and method of the treatment group?	___	___

		Yes	No
11.	Does the teacher maintain a disciplined, productive atmosphere in the classroom without a stifling type of control?	___	___
12.	Does the teacher consider individual differences in children's achievement and use this as a basis for determining intervention practices?	___	___
13.	Does the teacher criticize children's work in a destructive way?	___	___
14.	Does the teacher give individual children freedom to do "their own thing?"	___	___
15,	Does the teacher appear to encourage children to be creative?	___	___
16.	Does the teacher praise children on the basis of what they do, say or try? (Reacts and responds to the child's actions and contribution rather than just a "that's good")	___	___
17.	Does the teacher criticize children's work in a constructive way?	___	___
	TECHNIQUE GROUP ONLY:		
18.	Can the teqcher adequately demonstrate clay techniques either to the group as a whole or to individual children?	___	___
19.	Does the teacher have an awareness of individual differences pertaining to clay developmental levels?	___	___
20.	Can the teacher assist children at each clay developmental level to develop further understanding of the clay medium itself?	___	___
21.	Does the teacher stress technique without integrating the observation and discussion into it?	___	___

Please check one summary statement:

_____ a. The teacher does not implement the intended intervention strategy as an observable part of the clay instruction.

_____ b. The teacher does implement the intended intervention strategy at some point in the clay instruction but also uses techniques inappropriate for the intervention strategy.

_____ c. The teacher does implement the intended intervention strategy throughout the clay instruction and does not use techniques inappropriate for the intervention strategy.

Comments:

APPENDIX D

Budget Analysis

OHIO DEPARTMENT OF EDUCATION
ESEA TITLE III
781 Northwest Boulevard
Columbus, Ohio 43212

EXPENDITURE REPORT OF FEDERAL FUNDS, ESEA, TITLE III

☐ Estimated Expenditure Report ☒ Final Expenditure Report

Name of Agency	Project Number	Grant Period (Month, Day & Year)
Columbus Public Schools	508-2	Beginning: July 1,1975 Ending: May 31, 1977

PART I — Expenditures 270 East State Street, Columbus, Ohio 43215

EXPENDITURE ACCOUNTS			EXPENSE CLASSIFICATION							
Functional Classification		Acc't No.	Salaries		Contracted Services	Materials and Supplies	Travel	Equipment	Other Expenses	Total Expenses
			Prof.	Non-Prof.						
1		2	3	4	5	6	7	8	9	10
1	Administration	100	282.40			128.00			13,933.97	14,344.37
2	Instruction	200	74,181.68	9,156.22	32,215.13	2,502.93	392.02			118,447.98
3	Attendance Services	300								
4	Health Services	400								
5	Pupil Transportation Services	500			2,947.50					2,947.50
6	Operation of Plant	600							339.40	339.40
7	Maintenance of Plant	700								
8	Fixed Charges	800	11,367.56	1,439.18					181.00	12,987.74
9	Food Services	900								
10	Student-Body Activities	1000								
11	Community Services	1100								
12	Remodeling	1220c								
13	Capital Outlay (Equipment Only)	1230						193.90		193.90
14	TOTAL		$85,831.64	10,595.40	35,162.63	2,630.93	392.02	193.90	14,454.37	149,260.89

PART II — Fiscal Summary

1. Amount Authorized	$150,675.00
2. Amount Expended	$149,260.89
3. Unexpended Balance	$ 1,414.11
4. Cumulative Total	$206,375.00
5. Cash Received	$187,400.00

Signature of Superintendent Joseph L. Davis

Signature of Clerk William A. Gray

Date May 31, 1977

A-31